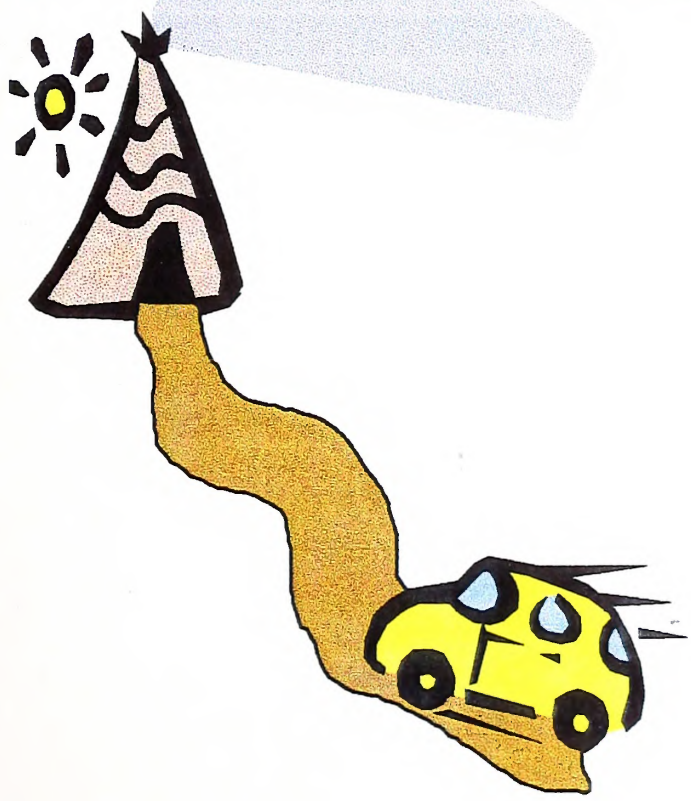
North Carolina Department of Transportation
Statewide Planning Branch

Tomorrow's Transportation in the Town of Waxhaw

A Summary Report Based on "The 1998 Transportation Report for the Town of Waxhaw"



October 1998

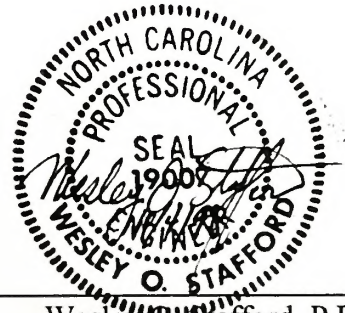
Tomorrow's Transportation in the Town of Waxhaw

A Summary Report Based on
"The 1998 Transportation Report for the Town of Waxhaw"

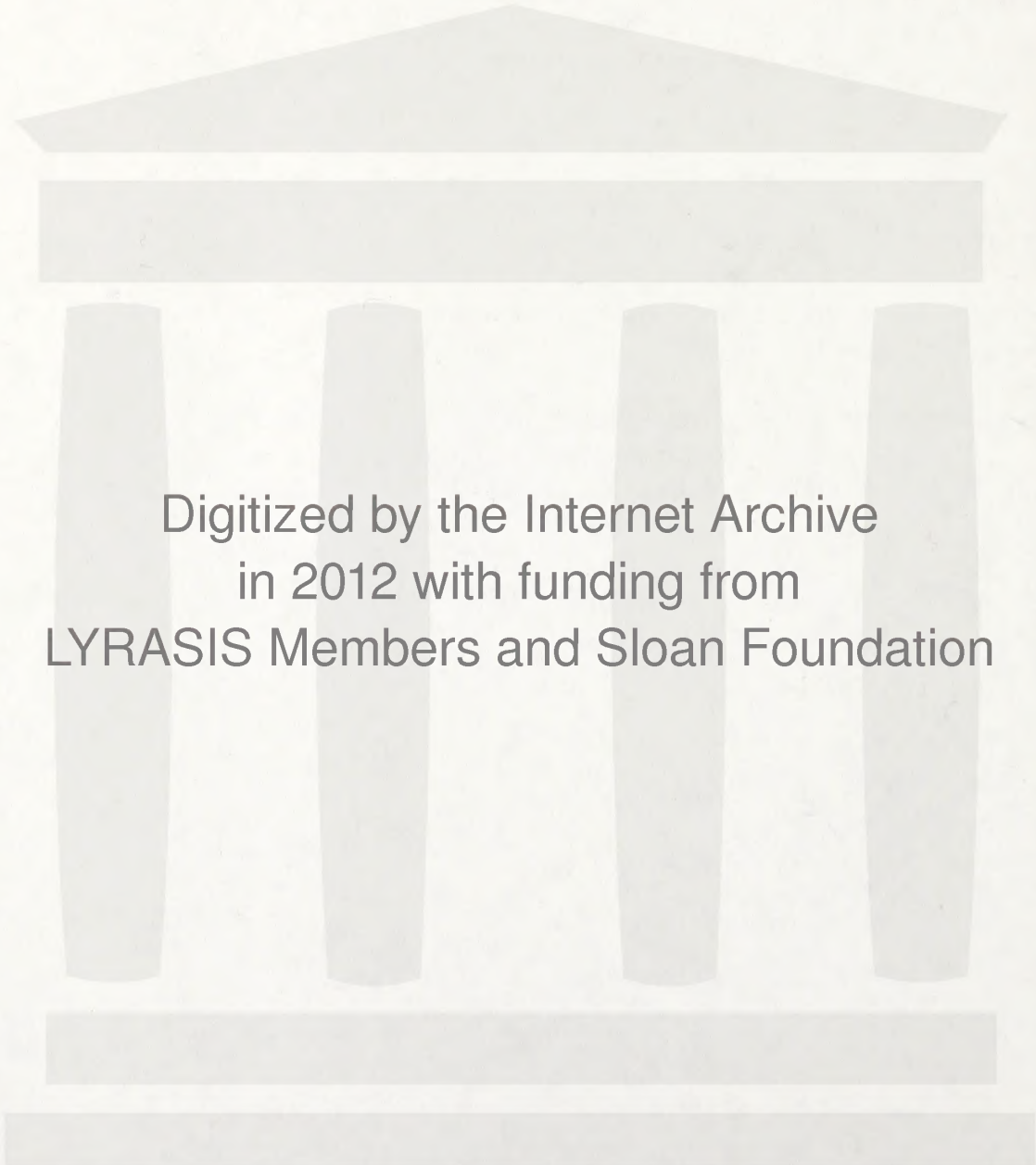
Prepared by the: Statewide Planning Branch
Division of Highways
N.C. Department of Transportation

In Cooperation with: The Town of Waxhaw
The Federal Highway Administration
U.S. Department of Transportation

October 1998



Wesley O. Stafford, P.E.
Small Urban Planning Unit Head



Acknowledgements

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Special Thanks to:

Bonnie McManus, Town Clerk of Waxhaw
Jack Hemby, Mayor of Waxhaw
Anthony Roberts, Centralina Council of Governments

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Chapter 1 - Introduction

The economic and social well being of the Town of Waxhaw depends upon the quality of the transportation facilities that exist in the area. If people are able to travel about freely in Waxhaw today and as the economy grows, then the transportation system has been planned to properly accommodate existing and future travel. A well planned transportation system will allow for economic growth, while simultaneously providing safe and efficient travel throughout the Town of Waxhaw.

This report is a brief summary of a larger, more in depth technical report entitled " The 1998 Transportation Report for the Town of Waxhaw". This report is intended to be a "primer" for the citizens and officials of the Town of Waxhaw. The content of this report will provide answers to the Town in regards to funding, plan implementation and traffic conditions. It will not include the details of how the plan was developed (data collection, modeling, public involvement) or describe the analysis of the system. This summary report will provide answers to these questions:

Why Plan in Waxhaw?

What Present & Future Transportation Problems Do We Have ?

How Can We Fix Them?

What Benefits Will These Improvements Provide Waxhaw?

How Much Will It Cost?

How Can We Implement the Plan?

This transportation plan is a joint effort by the North Carolina Department of Transportation and the Town of Waxhaw. This plan is intended to provide the Town of Waxhaw with the necessary roadway improvements to satisfy the anticipated transportation needs until the year 2025. The thoroughfare plan was developed based upon the current population, employment and travel trends in the area, as well as the Town's anticipated growth. It is important to realize that this plan is not a rigid set of proposals, but is intended to be flexible enough to account for changes in future growth. In all likelihood, this plan will be revised approximately every 5-8 years in order to re-evaluate the conditions in the Town of Waxhaw and to eliminate any possible adverse impacts of unnecessary transportation proposals.

Most of the improvements recommended in this report will be the responsibility of the NCDOT, but it is necessary for local officials, the local planning agency, developers and citizens of Waxhaw to assist in the implementation of this transportation plan. This plan should be used as a guide to protect areas in the Town where new or improved facilities may be located in the

future and should be used in conjunction with the Town's land use plan, zoning regulations, and subdivision regulations in order to facilitate all types of planning that concern the Town of Waxhaw.

Most of the improvements recommended in this report are concerned with local streets and highways. This is due to the dependency on the private automobile by the public. It is important to realize that these are recommendations for what is felt will be the "best possible solution" to the transportation issues in Waxhaw. It is ultimately the decision of the Town of Waxhaw as to which recommendations they want to adhere to and to determine how close they follow these recommendations.

Why Plan & How?

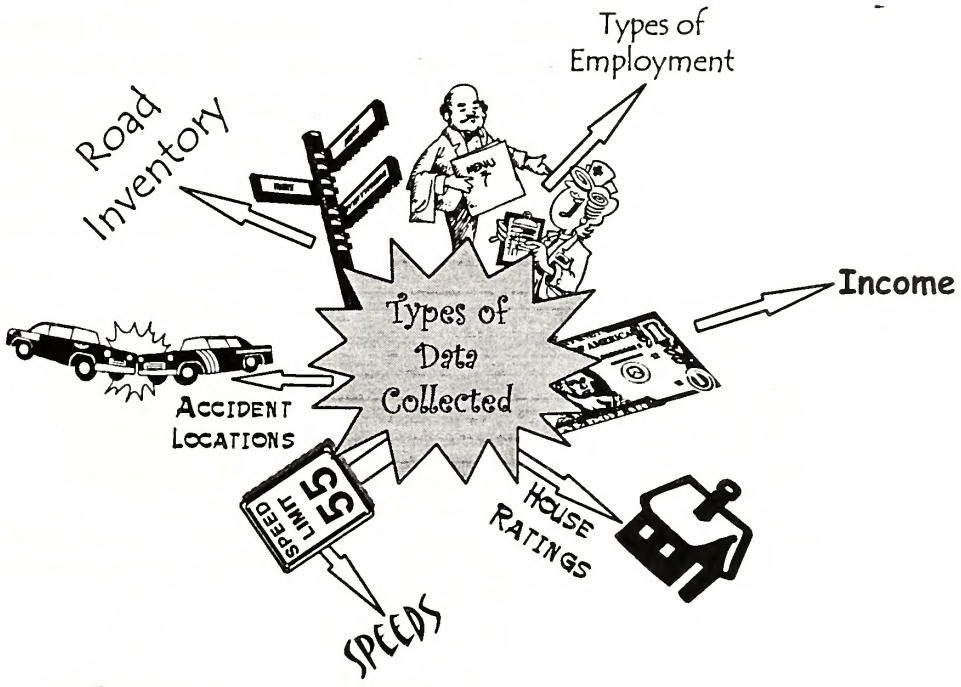
One of the biggest influences in the development of the Town of Waxhaw is the effectiveness of the transportation facilities. Meaning, how well are the different areas of Town connected to each other by roadways, and are these roads able to handle the traffic in Waxhaw. For example, is there a way for travelers to get from the new residential neighborhoods to Waxhaw Elementary School without going through downtown? Can NC 16 handle more traffic if more commercial development occurs? These impacts need to be looked at to determine if changes to the transportation system are necessary in order to guide future development toward meeting the goals of the Town. To control the growth of the Town while simultaneously achieving community goals, planning is a necessity.

Transportation planning provides a wealth of benefits to small communities, larger regional areas and ultimately to the State of North Carolina. Planning is viewed as an integral part of the growth and success of the State of North Carolina, so important that a law established by the State of North Carolina in 1959, requires that each municipality develop a comprehensive street network plan that will serve the citizens now and in the future. Some of the reasons for planning of transportation systems includes:

- *Minimizing land required for street & highway purposes*
- *Each street can be designed for a purpose (bypass, neighborhood connector, etc.)*
- *Savings in construction and maintenance of the roadways*
- *Citizens will know what the roads will look like in the future and can plan accordingly*
- *Developers will be able to design residential/commercial areas that will not interfere with the transportation plan*
- *Town officials will know when improvements are needed and can seek funding*
- *Minimization of damage to property owners and to the community appearance*

We know why to plan, but .....how to develop a plan? In order to plan the future transportation network, we must know everything possible about the community. The citizens of the Town are the biggest players in the development of the plan. Talking to people about what problems exist in the Town, what type of growth they expect, discussing what roads need improvement and the overall goals of the community is the biggest key to planning. If the citizens and officials know where they want to go in the future and what they want to happen to the local streets, then planning the transportation network is a lot easier.

A wealth of data is collected about the current roads, the travel patterns people use to get to their destinations (Do they use NC 16 or local streets to go to the grocery store?) and what type of people live in Waxhaw. Other types of data, such as the ones shown below, are also collected and used in the planning process.

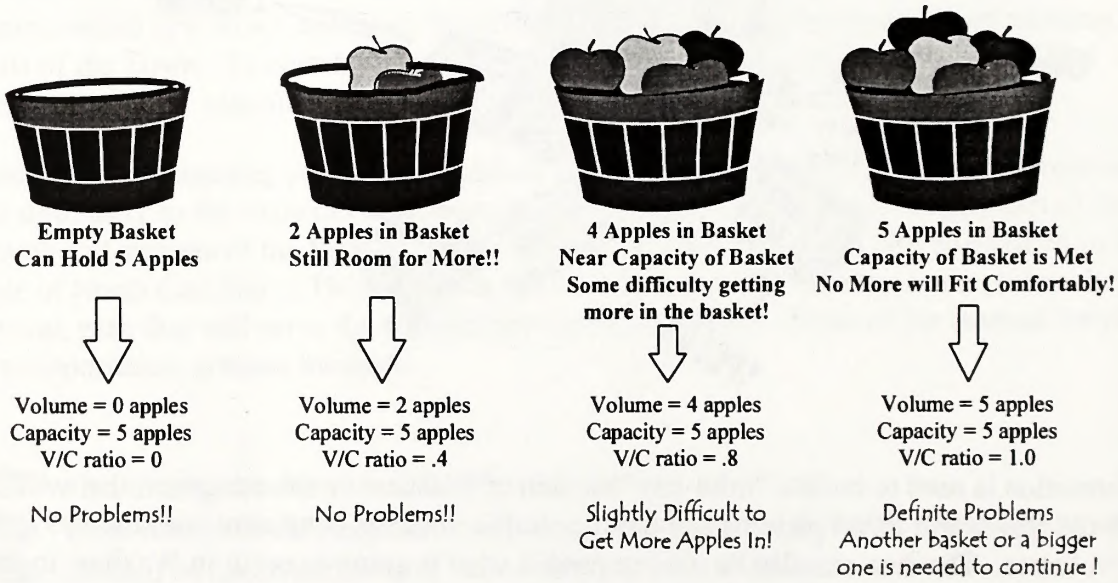


This information is used to build a "mini-city" version of Waxhaw on the computer, that will duplicate the real-world travel patterns and produce traffic volumes consistent with the 1997 counted volumes. The data can also be used to predict what is going to occur in Waxhaw in the future. The computer model aids in planning by helping to determine what new improvements will "fix" or improve the transportation network and ultimately a plan is developed based on the many different scenarios that are tested on the computer and developed by the citizens, the officials and the NCDOT.

This section answered the "How to Develop a Plan" but that is not where planning stops. Planning is a continuing process that involves corridor protection, development control, acquiring funding for roads and much more. All of these things together are called planning, but are discussed later in this report.

Current and Future Transportation Problems

Before "The Plan" is developed for the Town of Waxhaw, we must determine what traffic problems exist now or in the future. The computer model aids in this evaluation by showing us the traffic volume, or number of vehicles, using each road in Waxhaw on a daily basis. We can then compare the capacity (the number of vehicles that can travel on the road and still experience efficient travel) of each section to the number of vehicles actually using the road. If the number of vehicles using the road is almost the same or more than the number it can efficiently handle, otherwise known as the volume/capacity ratio, then we have a transportation problem, or roadway deficiency. The following cartoon illustrates the concept of volume/capacity ratio (V/C).



This apple illustration shows that as the V/C ratio gets near one you may experience some difficulty trying to put more apples in the basket and when the V/C ratio is at or above one it is overloaded and no more apples will fit without a new basket or making the existing one bigger. This is the exact same concept for traffic on roadways. If the V/C ratio is near one it makes traveling slow and not many more cars can fit on the roadway before overloading ($V/C \geq 1.0$) it. When the V/C ratio is one or more for roadways, we get congestion and travelers experience discomfort in driving. We must then add a new road, widen the existing one or take some other alternative to improve the roadway capacity!

The existing roadway network (1997) and future roadway (2025) were evaluated based on the volume to capacity ratio. The 2025 network assumes that no new roads are built and no widening of existing roads occurs. Figures 1 & 2 show the expected roadway deficiencies, or congestion problems, for 1997 & 2025. The roads that are near capacity (.9 < v/c <1.0) are in green and the roads over capacity (v/c > 1.0) are in red.

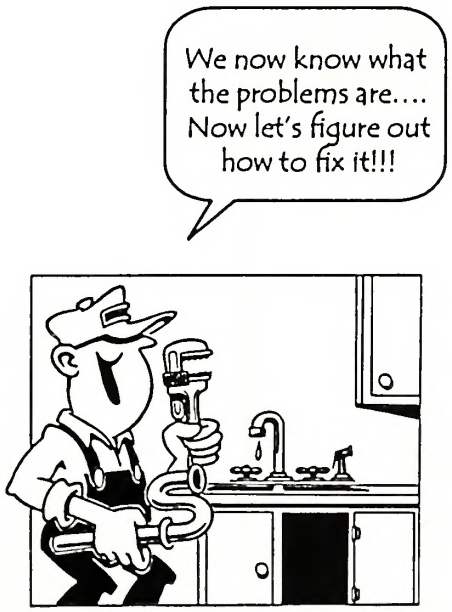
There are a few deficiencies on the current network and a lot of deficiencies in the year 2025. As the deficiency map for 2025 shows, the following roads will be overloaded and not working efficiently:

1) NC 16 - from Twelve Mile Creek down to the intersection with NC 75

2) NC 75 - from Rehobeth Road east to the Hermitage Place subdivision.

3) SR 1111 (Old Providence Road/Old Waxhaw Monroe Road) - from NC 75 to SR 1117 (Providence Road)

Once the roads that are experiencing some problems are identified, then we can begin determining a way to fix the transportation problems in the area.

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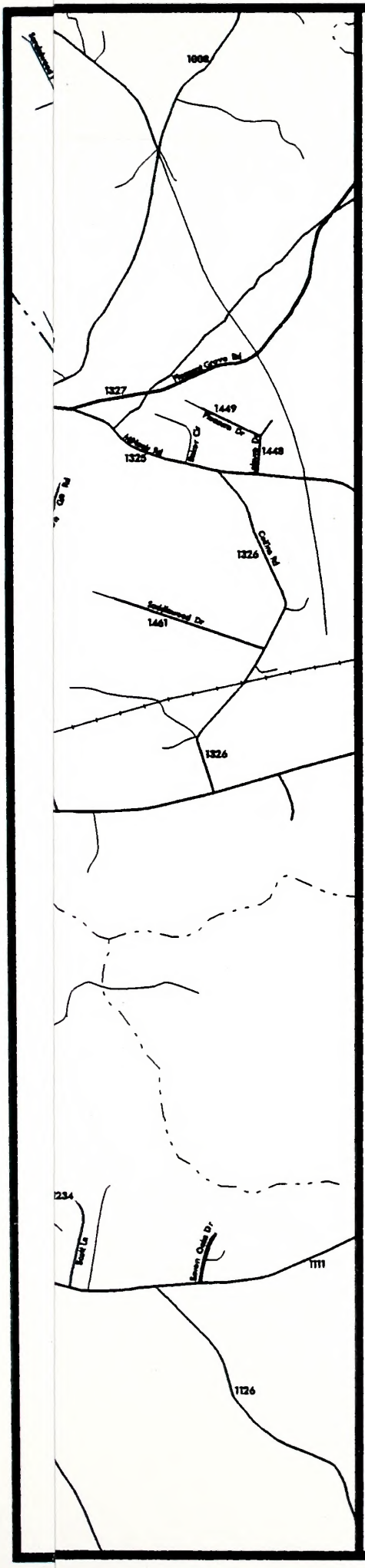


FIGURE 1

1997 CAPACITY DEFICIENCIES

FOR THE TOWN OF

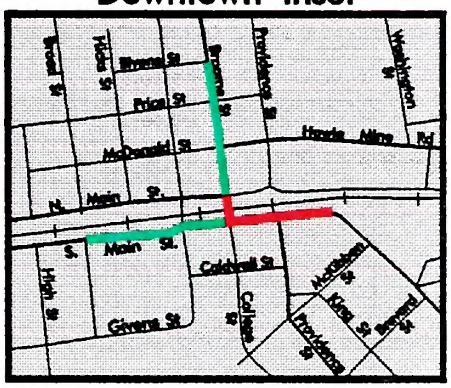
WAXHAW

LEGEND

Near Capacity
0.9 < V/C < 1.0

Over Capacity
V/C > 1

Downtown Inset



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SCALES

0 0.25 0.5 1.0
miles

0 1000 2000 4000 6000
feet

Map Date 12-04-97


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FIGURE 1

1997 CAPACITY DEFICIENCIES

FOR THE TOWN OF

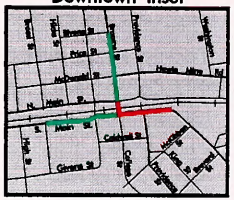
WAXHAW

LEGEND

Near Capacity
0.9 < V/C < 1.0

Over Capacity
V/C > 1

Downtown Inset



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Map Date 12-04-97

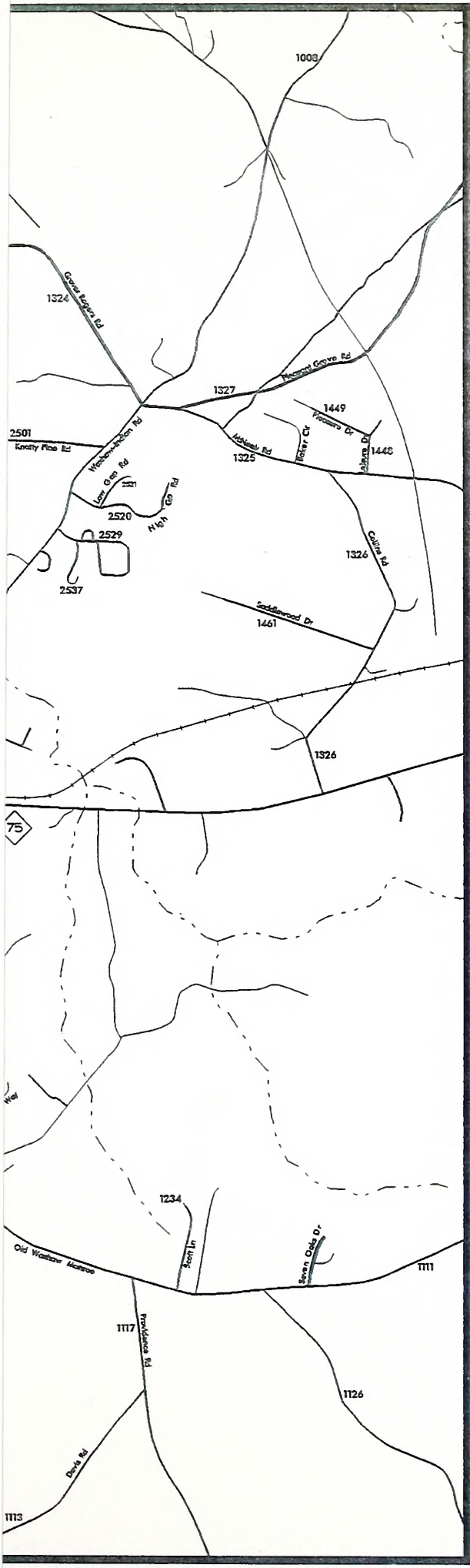


FIGURE 2

2025 CAPACITY DEFICIENCIES

FOR THE TOWN OF

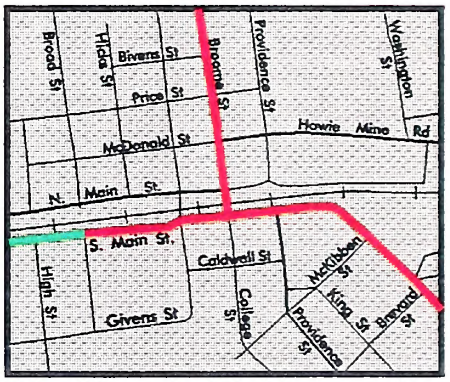
WAXHAW

LEGEND

Near Capacity
0.9 < V/C < 1.0

Over Capacity
V/C > 1

Downtown Inset



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SCALES

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miles

0 1 2
kilometers

Map Date 12-04-97

FIGURE 2

2025 CAPACITY DEFICIENCIES

FOR THE TOWN OF

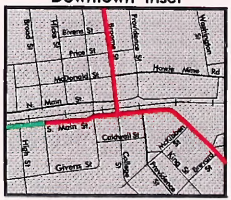
WAXHAW

LEGEND

Near Capacity
0.9 < V/C < 1.0

Over Capacity
V/C > 1

Downtown Inset



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Map Date 12-04-97

Chapter 2 - What's "the Plan" of Attack for Waxhaw?

Discussion of Thoroughfare Plan

In the previous section we determined the specific roadways in Waxhaw that would be overloaded in the future, thus creating a transportation problem. In order to fix the problems we must develop a "plan of attack". The "plan of attack" that we develop is called the Town of Waxhaw's Thoroughfare Plan. The goals of the developed plan for the Town of Waxhaw are to relieve traffic congestion, improve safety, air quality, promote growth and improve the overall efficiency of the transportation network.

The mutually adopted plan that will satisfy all the goals is shown in Figure #3. This plan displays all the major and minor thoroughfares (roadways) in Waxhaw from 1997 to 2025, both existing and proposed. As part of the understanding of the adoption of this plan the minor thoroughfares are the responsibility of the Town of Waxhaw, while the maintenance and construction of the major thoroughfares is the responsibility of the North Carolina Department of Transportation. Figure #4, the recommended improvement map, displays the number of lanes and roadway widths for each of the proposed improvements. These are the recommendations of how we think the roads "should look" after widening or new construction is complete. These recommendations may change slightly after the actual design of the road is determined.

In Appendix A, you can see the specific details of each roadway in the plan. The right-of-way requirements, the length of each section, the volumes, the capacities and the cross sections are all listed in this appendix.

Figure #5 displays the prioritized projects for the Waxhaw Thoroughfare Plan. ***The recommendations for what the roadways should "look like" and what the need is for each project are described in priority order for the remainder of this section.***


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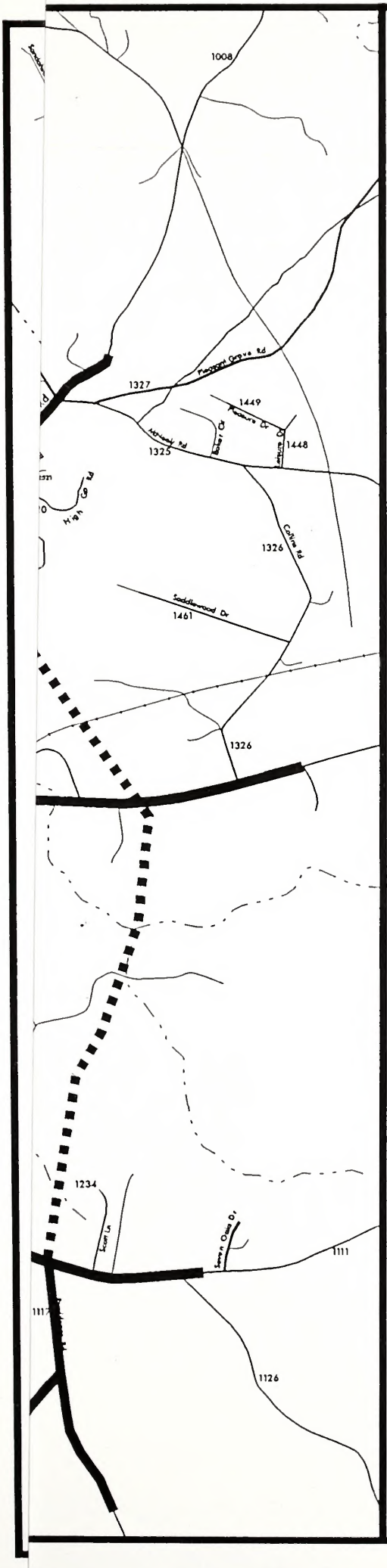

FIGURE 3

THOROUGHFARE PLAN

FOR THE TOWN OF

WAXHAW

LEGEND

	Existing	Proposed
MAJOR THOROUGHFARE	▬▬▬	■ ■ ■ ■
MINOR THOROUGHFARE	▬▬▬	▪ ▪ ▪ ▪

ADOPTED BY:
Town of Waxhaw — December 8, 1997

NCDOT: — February 6, 1998

RECOMMENDED BY:
Statewide Planning — January 16, 1998

Public Hearing Date: December 8, 1997

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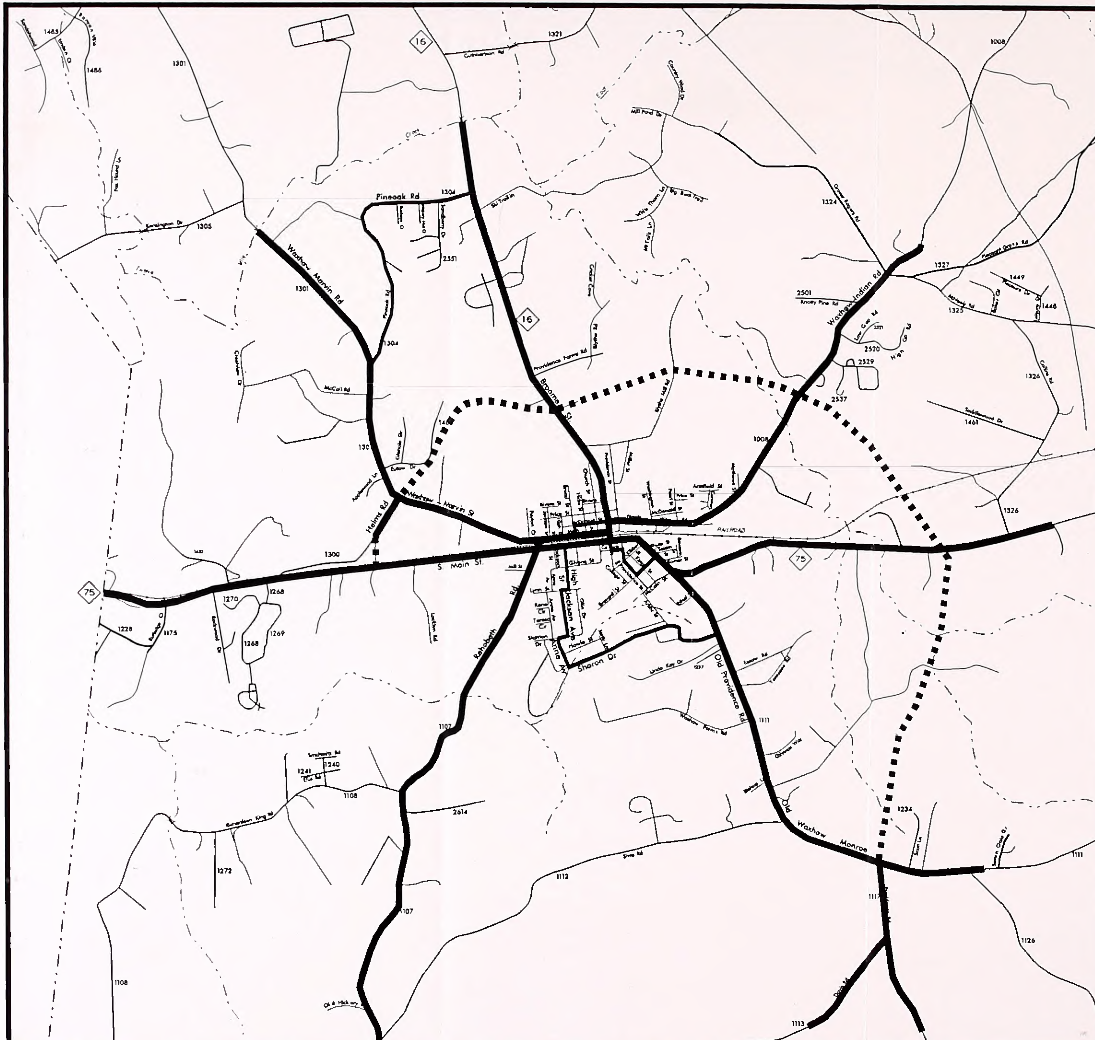

FIGURE 3

THOROUGHFARE PLAN

FOR THE TOWN OF

WAXHAW

LEGEND

	Existing	Proposed
MAJOR THOROUGHFARE		
MINOR THOROUGHFARE		

ADOPTED BY:	
Town of Waxhaw	December 8, 1997
NCDOT:	February 6, 1998
RECOMMENDED BY:	
Statewide Planning	January 16, 1998
Public Hearing Date:	December 8, 1997

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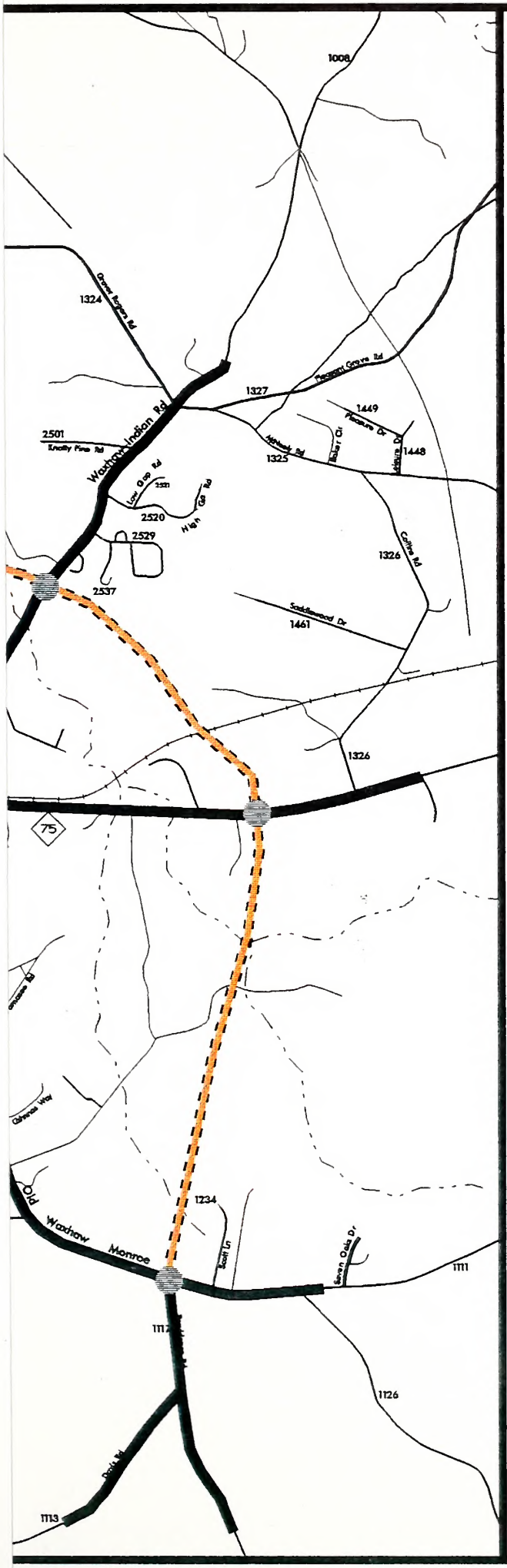

FIGURE 4

RECOMMENDED IMPROVEMENTS

FOR THE TOWN OF

WAXHAW

THOROUGHFARE PLAN LEGEND

	Existing	Proposed
Major Thoroughfare	▬▬▬	▪▪▪▪
Minor Thoroughfare	▬▬▬	▪ ▪ ▪

RECOMMENDED IMPROVEMENT LEGEND

- Five Lane Curb & Gutter
- Three Lane Curb & Gutter
- Two Lane 24' w/Paved Shoulders
- Two Lane w/Right Turn Lane for School
- Intersection Improvements

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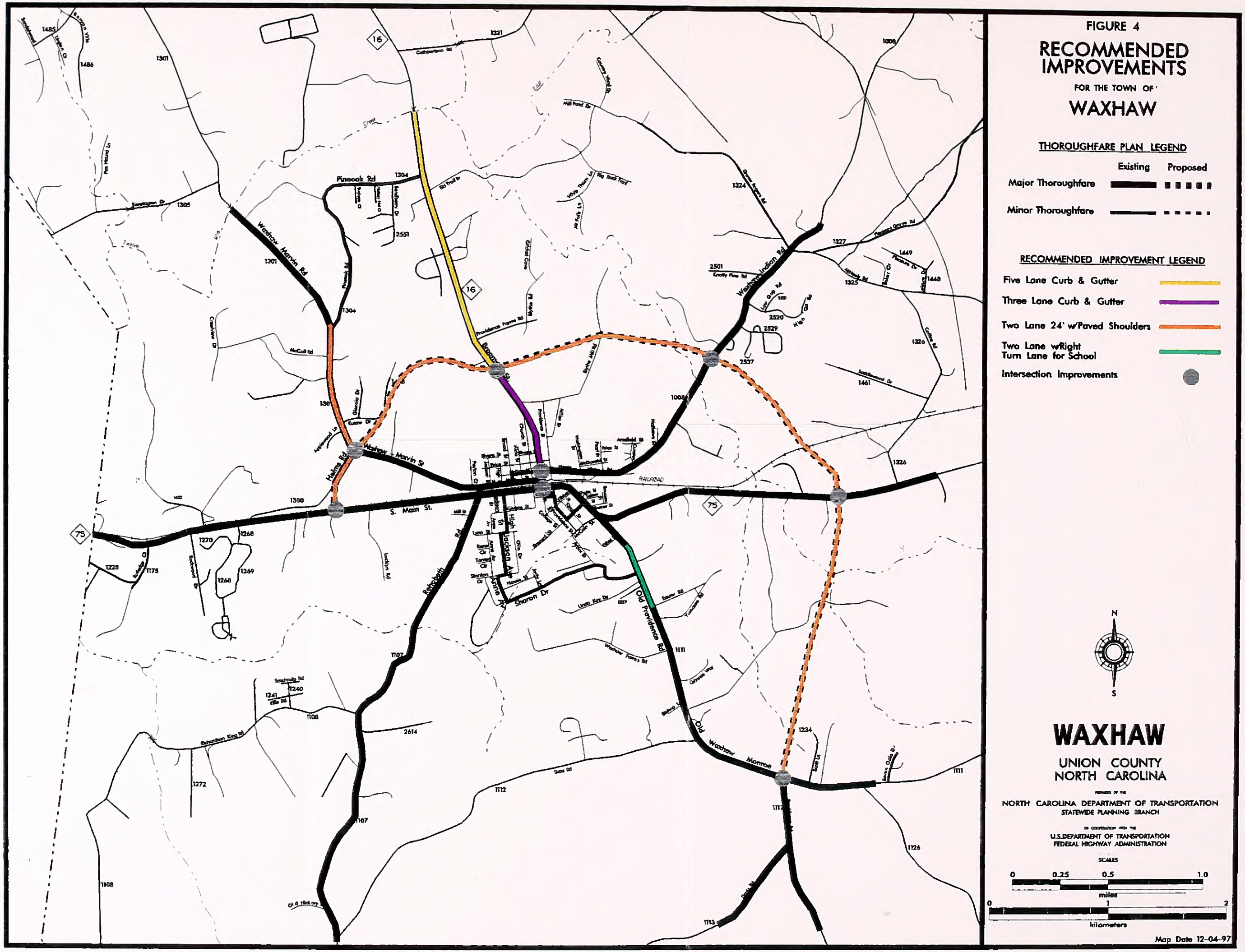
FIGURE 4
RECOMMENDED IMPROVEMENTS
FOR THE TOWN OF
WAXHAW
THOROUGHFARE PLAN LEGEND
Existing
Proposed
Major Thoroughfare
Minor Thoroughfare
RECOMMENDED IMPROVEMENT LEGEND
Five Lane Curb & Gutter
Three Lane Curb & Gutter
Two Lane 24' w/Paved Shoulders
Two Lane w/Right Turn Lane for School
Intersection Improvements
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kilometers
Map Date 12-04-97
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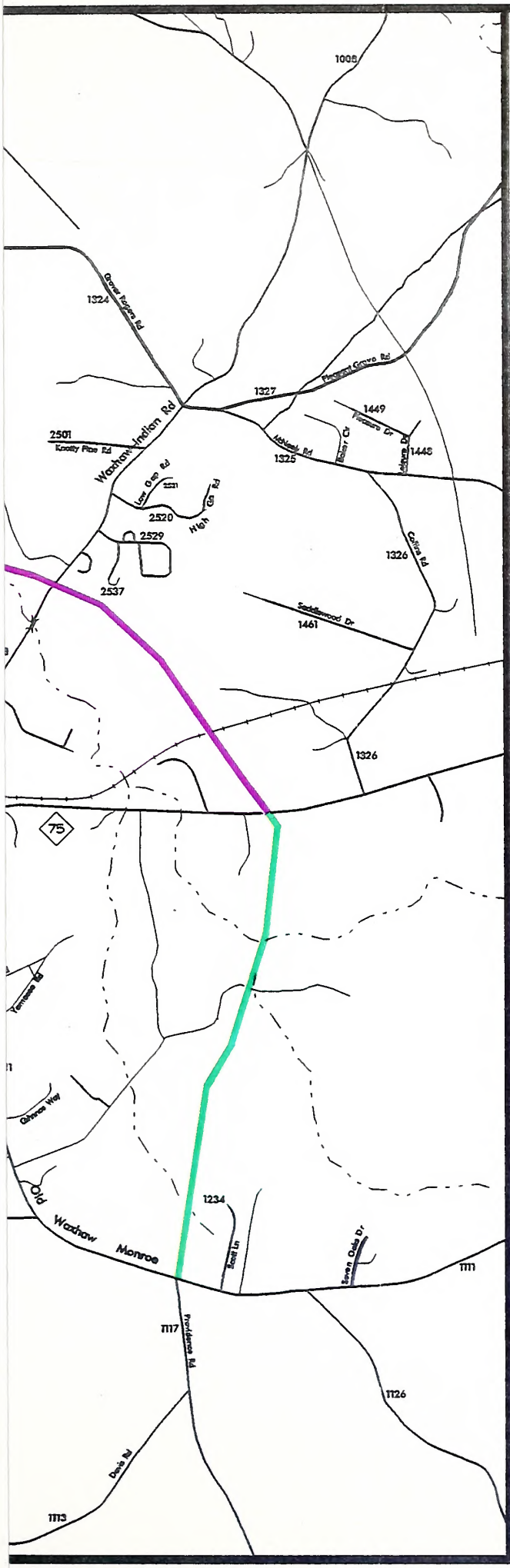
Pinoak Rd
Waxhaw Marvin Rd
Waxhaw - Marvin St
Helms Rd
S. Main St.
Rehoboth Rd
Jackson Ave
Sharon Dr
Old Providence Rd
Waxhaw Indian Rd
Old Waxhaw Monroe
RAILROAD
Providence Farms Rd
Cuthbertson Rd
1321
1301
1304
1305
1324
1327
1325
1326
1008
1300
1268
1270
1269
1228
1175
1107
1108
1111
1112
1113
1126
1234
1272
2614
2551
2501
2529
2537
1461

FIGURE 5

PRIORITIZED PROJECTS

FOR THE TOWN OF

WAXHAW



LEGEND

- 1st Priority (NC 16 widening)
- 2nd Priority (Howie Pkwy Section A)
- 3rd Priority (Howie Pkwy Section B)
- 4th Priority (Howie Pkwy Section C)
- 5th Priority (Old Providence Rd Widening)
- 6th Priority (Waxhaw–Marvin St Widening)

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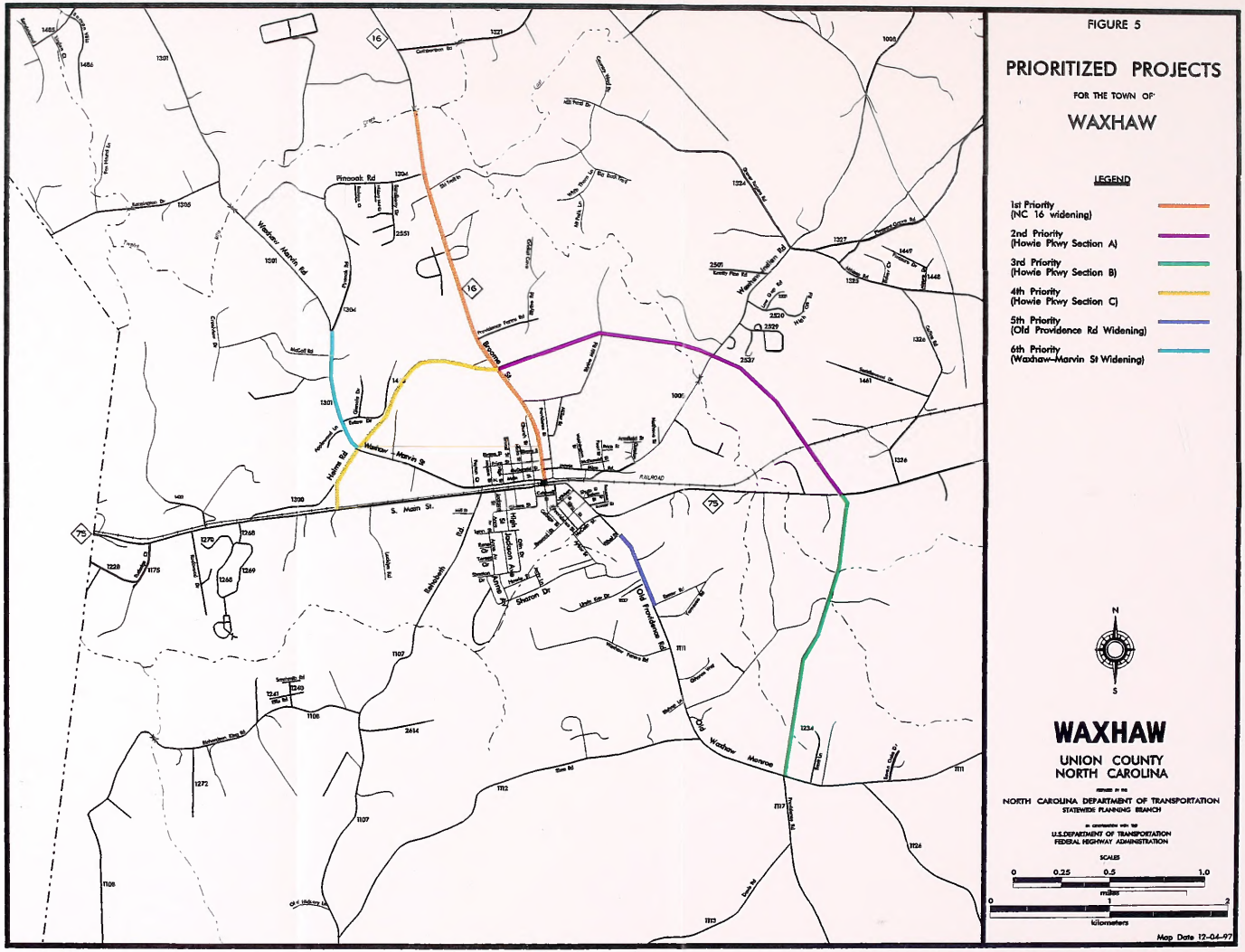
FIGURE 5
PRIORITIZED PROJECTS
FOR THE TOWN OF
WAXHAW
LEGEND
1st Priority
(NC 16 widening)
2nd Priority
(Howie Pkwy Section A)
3rd Priority
(Howie Pkwy Section B)
4th Priority
(Howie Pkwy Section C)
5th Priority
(Old Providence Rd Widening)
6th Priority
(Waxhaw-Marvin St Widening)
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U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
SCALES
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miles
0 1 2
kilometers
Map Date 12-04-97

Priority #1 - NC 16 Widening

Description of Project

It is recommended that NC 16 be widened from the Twelve Mile Creek Bridge to NC 75. The existing two lane section should be five lanes from the bridge to the proposed Howie Parkway and continue to NC 75 as a three lane section in order to accommodate the varying traffic demands. The estimated cost of this project is $6.6 million. The ultimate right-of-way is approximately 90'.

Transportation Demand

The transportation demand for this project focuses on both local traffic and through trip travelers. NC 16 is the only North/South facility through the Town of Waxhaw and the primary route for people living in Waxhaw and working in Charlotte. The through traffic along this corridor comes from travelers between Charlotte and Monroe, as well as those traveling from South Carolina or west of Waxhaw to Charlotte. Since the primary location for new residential areas is located along NC 16 between Waxhaw and Charlotte, a lot of local traffic uses NC 16 to get to commercial developments along the route. In the Town limits of Waxhaw people have no alternative shopping centers except for the Hickory Center on NC 16, and therefore they must travel NC 16 on a daily basis to get to the drug store, grocery store, bank or post office. The 1997 traffic volumes are around 9,000 vehicles per day(vpd). With the completion of the Charlotte outer loop, the Ray Road extension project and the residential growth the traffic is expected to increase to 19,100 vehicles per day by the year 2025. The left turns into the developments along NC 16 create a stop delay for the through motorists because there are no turn lanes for turning vehicles to wait.

Safety and Capacity of the Project

The existing capacity of NC 16 is around 12,000 vehicles per day. The capacity of NC 16 will be exceeded by 7,000 vehicles in the 2025 design year. The morning and afternoon peak periods will experience considerable delay due to the heavy left turning volumes onto and off of NC 16. The safety issues associated with this section of roadway will be an increased number of accidents due to the close proximity of vehicles on the overloaded roadway and the high number of left hand turns into this heavy traffic stream. Widening of this facility will allow turning vehicles a safe lane to wait in until they can complete their turn. The current right of way will allow for the widening of this facility to three lanes easily through Town. The right of way necessary for the five lane section can easily be acquired due to the availability of land and the careful planning of the Town.

Social Demands & Economic Development

This route serves as the primary location for residents of the Town of Waxhaw to get their grocery shopping, banking and other commercial activities accomplished. In the last few years a Food Lion, Eckerd's, Hardee's and other commercial developments have been established along this corridor. There are also plans for a tremendous amount of commercial growth on the east side of NC 16, with several large businesses such as a Walmart, gas stations and a regional post office building. The commercial developments are only part of the social impacts along the

corridor because the residential areas have the greatest affect on NC 16. Waxhaw is known as a "bedroom community" for Charlotte because of its proximity, the large tracts of land that are available and the price of that land. Thus, many residential neighborhoods are developing in the NC 16 corridor. At present there are plans for over 500 houses in the area between the Twelve Mile Creek Bridge to the Hickory Grove Shopping Center. All of this residential development will have to be accessed by NC 16 because there are no other north/south routes through the Town. An added impact from these developments is the location of the schools in Waxhaw. All of the schools in Waxhaw are located to the south of the Town. Therefore, the people living in the residential neighborhoods located in the northern part of Waxhaw must travel through Town on NC 16 to get to the schools they attend. This puts a heavy demand on the roadway's ability to function at a high level of efficiency and since there is no other parallel facility to relieve the congestion widening of this roadway is necessary.

Relationship of NC 16 Widening to Other Roadways in the Area

The widening of NC 16 is very important to the connectivity of the transportation system in Waxhaw. NC 16 will serve as a major link from the Charlotte Outer Loop and the Ray Road Extension projects. These projects will make commuting to Charlotte more convenient for residents living in the surrounding bedroom communities. A concern that needs to be addressed is the effect of the additional burden on NC 16 as a feeder facility to the Charlotte Outer Loop and the major link from Waxhaw.

NC 16 will also serve as the principle connection for the proposed Howie Parkway. Howie Parkway will "bypass" the downtown area of Waxhaw and will connect with NC 16 in a large commercial area. The bypass will remove approximately 10,000 vehicles out of downtown Waxhaw. People will be unlikely to use the bypass if it does not function as a faster and safer transportation alternative than the one that currently exists. If NC 16 is not widened then the traffic coming from the bypass will be merged with the traffic going through downtown and it will create a highly congested area of traffic. There will be no incentive to use the bypass if NC 16 is not widened because the travel time will not improve substantially. Therefore if NC 16 is not widened then the Howie Parkway will lose its function in the transportation system.

NC 16 also serves as a connection to another North Carolina route (NC 75). NC 75 is an important route from South Carolina into North Carolina and carries over 700 trucks daily. The connection of NC 16 to NC 75 is important to commerce and to interstate travel in this area of North Carolina.

Overall, NC 16 is the "hub" for traffic in Waxhaw. It serves traffic from the east in Monroe, from the west in South Carolina, from Charlotte in the north and the local Waxhaw traffic. NC 16 is the only north/south link to all the destinations in Waxhaw.

The widening of this facility is important to the overall success of the transportation system in Waxhaw and can be completed with minimal impacts to the community. It would also positively impact residential and commercial developments in Waxhaw. Building a new north/south facility would not facilitate the needs of the travelers in the area. The widening of this facility is also in the unadopted Union County Thoroughfare Plan.

Priorities # 2, 3, 4 - Howie Parkway Sections

Project Recommendation - It is recommended that a bypass facility be constructed on new location to alleviate the congestion on NC 16 & NC 75 in downtown Waxhaw. This facility begins at Providence Road (SR 1117) makes a partial loop around the Town and terminates on NC 75 west of the Town. The loop facility consists of three sections that have varying purposes, lane configurations, and costs. It is recommended that the entire Howie Parkway Facility be limited access, governed by the Town. The total cost of the entire Howie Parkway is approximately $12.5 million. The Howie Parkway is important to the transportation network, however, certain sections are more important than others and therefore each section of the Howie Parkway Facility is discussed as an individual project below. *For ease of discussion and distinguishing between sections, the Howie Parkway will be distinguished as Sections A,B &C (Shown in Fig. 5).*

Priority # 2 - Howie Parkway Section A

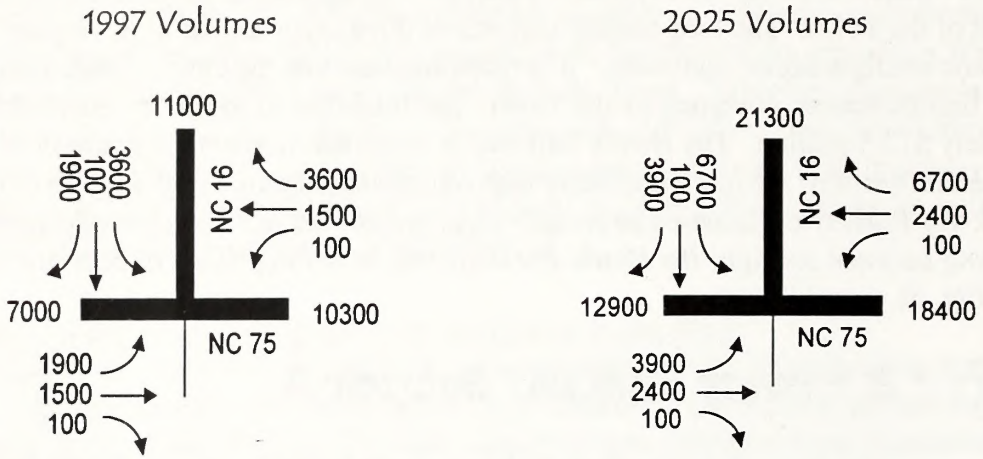
Project Recommendation - It is recommended that a bypass facility on new location be constructed beginning on NC 75 east of Waxhaw (approximately 1800' west of Collins Rd.) and terminating on NC 16 at Simonetti Drive. The roadway will be a three lane curb & gutter section that will span approximately .66 miles at which it will become a two-lane paved shoulder section until it terminates onto NC 75. The cost of this project is expected to be $ 4.98 million. This project is considered the most important section of the Howie Parkway and would be a sufficient stand alone facility even if the other portions of the bypass are not built. The ultimate right-of-way is approximately 100'.

Transportation Demand - NC 16 and NC 75 are major routes in the Town of Waxhaw that serve through traffic from Monroe to Charlotte as well as the local traffic in Waxhaw. NC 16 terminates when it intersects NC 75 in downtown Waxhaw. NC 16 is the only north/south route in Waxhaw while NC 75 is the primary east/west route. Volumes on NC 16 range from 7,300 vpd near Twelve Mile Bridge to 11,000 vpd at the NC 75 intersection. Volumes on NC 75 range from 10,300 downtown to 8,700 east of the Waxhaw city limits. All through vehicles are forced to go through the only signalized intersection in Town in order to get to their destination. The local traffic must use this section of roadway to go from the main residential locations to the shopping and school areas. This creates a heavy demand on the one signalized intersection in Town. Figure 6 shows the current and future volumes at this intersection.

The left turning movement from NC 16 onto NC 75 is the heaviest movement. Currently both NC 16 & NC 75 are two lane facilities in downtown Waxhaw. On NC 75 there are historic buildings on one side of the road and a railroad track on the other side, therefore there is no room for widening this facility. The volumes of traffic in the downtown area are compounded by the location of the railroad track. The track forces people to slow down at this intersection in order to cross safely and causes added delay and congestion in the area. Section A of the Howie Parkway would reduce the 2025 turning movements from NC 16 to NC 75 east by 8,800 vehicles a day. This facility removes through traffic and provides local traffic an alternate path

of travel to their destinations. This portion of the loop would serve an independent function even if the rest of the bypass is not constructed.

Figure 6 - NC16 & NC 75 Turning Movements



Capacity -

The capacity for NC 75 and NC 16 is approximately 13,000 vpd outside of the city limits. NC 16 downtown at the railroad crossing has a capacity of approximately 8,000 vpd and NC 75 has a capacity of 11,000 vpd. Currently in downtown, NC 16 is over capacity by 3000 vehicles and NC 75 is at capacity. By the year 2025 at this intersection, NC 16 will exceed capacity by 13,000 vehicles and NC 75 will be over by 8,000 vehicles. There will be no flow of traffic in this area if nothing is done to improve the conditions. Widening the NC 75 corridor is not feasible because of the historic businesses and the railroad track. Section A of the Howie Parkway would provide a bypass facility to remove both local and through traffic from downtown.

Safety -

If Section A of the Howie Parkway is not built, tremendous congestion and delay will occur in the peak periods of the day. The safety conditions associated with a roadway that has 8-13,000 more vehicles than its capacity will result in a high number of accidents. Primarily rear-end accidents because of the stop-start conditions throughout the corridor. In the past three years there have been 21 accidents at the NC 75 & NC 16 intersection alone. Rear-end collisions or left turn sideswipes accounted for 18 of the accidents. The railroad track in the downtown area causes vehicles to slow down or stop immediately before/after making a turn at a signal. The potential for accidents because of the close proximity of the signal and the railroad is extremely high. With the additional burden of 11,000 vehicles per day at this location the accident rate could drastically increase due to the congestion.

Truck traffic in this area also brings concerns for safety in the Waxhaw area. NC 75 has slow posted speed limits in the downtown area and most of the trucks that come through are not able to function properly at that low speed. The starting/stopping ability creates major delays downtown and disrupts the traffic flow. The lane widths also cause some concern. It is difficult

for trucks or large vehicles to navigate through Town without crossing over the other lanes of travel and creating conflicts with the on-street parking downtown. A bypass facility would allow them to operate at a higher speed and reduce the conflicts with vehicles and pedestrians in Waxhaw.

Social Demand/Economic Development -
The economic development along NC 16 is expanding rapidly. There are several 50+ acre commercial land plots for sale between NC 75 and the Twelve Mile Bridge, thus re-enforcing the thought that this area is expected to experience tremendous commercial growth. In particular there are two commercial developments that will have a tremendous impact on traffic. One is the new post office that will be built on the corner of NC 16 and Simonetti Drive the other is a multi-use 64 acre commercial area to be built on NC 16 opposite of the post office. Both of these developments, along with the addition of 500 houses already planned along this area, will generate additional traffic in the NC 16 corridor. In order to reduce the traffic going into downtown, a bypass facility connecting NC 16 with NC 75 east of Town is necessary. This will allow people to avoid the downtown area and still provide direct access to the newly developed commercial areas. Section A of the facility will travel through the middle of the commercial areas and still provide motorists a way around the downtown of Waxhaw.

Relationship of the Howie Parkway Section A to Other Roadways in the Area -
Section A of the Howie Parkway is a valuable link in the transportation system for Waxhaw. Without this bypass facility, all of the traffic must travel through the main intersection downtown in order to get any other area of Waxhaw or the surrounding areas. The widening of NC 16 will serve to reduce the congestion for the majority of the corridor but would still "funnel" traffic through downtown Waxhaw. The only way to reduce the traffic downtown is to provide an alternate route around the Town. Section A of the Howie Parkway serves that function. The main function of Section A is to get through traffic going to Charlotte from the east out of downtown. The second function is to provide a direct route into the primary commercial areas of Waxhaw for the local citizens as well as through travelers. Currently, there are two main "links" or travel paths in the Waxhaw transportation network: NC 16 and NC 75. They are connected at only one location, in the middle of downtown Waxhaw, and therefore this is the only travel path from east to north. By providing another link that allows higher speed travel from the east to the north, it will reduce the congestion in Waxhaw. Since, the developer for the multi-use commercial area is paving 2/3 of a mile and dedicating to NCDOT 120' of right-of-way for the entire length, continuing this link onto NC 75 east of Town would be logical and would aid the movement of traffic in the Waxhaw transportation system.

Priority # 3 - Howie Parkway Section B

Project Recommendation -
It is recommended that a bypass facility on new location be constructed beginning on NC 75 east of Waxhaw (approximately 1800' west of Collins Rd) and terminating at the intersection of Old Waxhaw-Monroe Road (SR 1111) and Providence Road (SR 1117). The roadway will be a 24' two-lane paved shoulder section with limited access. The cost of this project is expected to be

$ 3.7 million. The ultimate right-of-way is approximately 100'.

Transportation Demand -
Currently, Waxhaw-Monroe Road (SR 1111) has approximately 6,000 vehicles per day (vpd) with 2025 volumes expected to be 11,000 vpd. This roadway serves as the main route to all of the schools in Waxhaw area. The elementary school is located on SR 1111 and the middle school and high school are accessed by traveling along this roadway to SR 1117. Due to the location of the residential areas in Waxhaw this road is heavily traveled because of the school locations. There is also a large number of students who are driven to school by their parents in the Town of Waxhaw, thus creating added volumes on the facility. With the enormous growth in housing expected on NC 16 north of downtown, this facility will almost double its volumes.

There are also many through travelers along SR 1117. People who live south of Waxhaw use this route to travel through Town en-route to Charlotte. It is also used as the main route to get to JAARS Inc., a relief organization and the museum that accompanies it. JAARS is a major employer outside of the Waxhaw planning boundary and therefore attracts a large number of commuting vehicles on a daily basis. Since this is one of only two north/south routes south of NC 75 motorists must use this facility to get through Town. Section B of the Howie Parkway will provide a route that will serve the north/south through traffic and avoid the congestion associated with the elementary school. This facility will remove approximately 5,000 vpd from SR 1117 and the downtown intersection of NC 16 & NC 75.

It is anticipated that this new facility would decrease the vehicle miles traveled (VMT) by 36.7 million miles over 25 years and reduce time and operating costs by approximately 16 million dollars.

Capacity -
The existing capacity of around 11,500 vehicles on SR 1111 is sufficient for the 6,000 vehicles that currently exist. However, when the future 2025 volumes reach 11,000 the roadway will be at capacity and the stop conditions associated with the school traffic will create major delays. By adding a new facility parallel to SR 1111 the through travelers would have a more efficient route from north to south while travelers accessing the elementary school and the surrounding neighborhoods would use the current facility. The capacity of Section B of the Howie Parkway would be 13,000 vpd and with the expected volume of 5,000 vpd it would operate efficiently. The existing route, SR 1111, would have 5,500 vpd if Section B built was built and would return to operating at a safe and efficient level.

Widening of this facility would alleviate the capacity problems but would still direct all of the traffic into the downtown area. Since the goal is to avoid adding vehicles downtown, widening is not an option.

Safety Issues -
There are a few safety issues that the new facility would help to address primarily the safety of the elementary school children. Currently, some children walk to school and are forced to cross this roadway with the aid of a police officer. However, there are no sidewalks for them to walk

on so they use the shoulder of the road. With the number of vehicles using this facility in the future that could be potentially dangerous for those children. In addition, the school buses are forced to pull out onto this heavily traveled roadway and this could create some safety problems. Another safety issue is the intersection of SR 1111 with NC 75. Currently at this intersection it is difficult to see cars approaching from the east. The new road location would reduce the number of vehicles that are required to stop at this intersection daily and would ultimately reduce the accident risk at this location. It is estimated that approximately $1.9 million in accident costs over 25 years will be saved due to the new facility.

Social Demands -
As previously mentioned the main demand in this area is the elementary school and the limited neighborhoods in the area. Associated with the school are the athletic fields for youth sports, thus large traffic generators. There are no planned subdivisions along SR 1111 but the effect of the subdivisions being built north of Town will impact this section of roadway. Section B of the Howie Parkway will encourage economic growth on the south side of NC 75 because of its location and land availability.

Relationship of the Howie Parkway Section B to Other Roadways in the Area -
Section B of the Howie Parkway would be considered a bypass facility because it allows people to go avoid the congested downtown area. It would connect into NC 75 with Section A of the bypass and would allow for a continuous north/south flow of traffic without having to go through downtown. Thus the citizens that live in the northern section of Waxhaw that have to go to the middle or high school can use this higher speed and more efficient facility to get to their destination. It also allows local people traveling from NC 75 east of Town a shorter travel path to the south of Town.

Priority # 4 - Howie Parkway Section C

Project Recommendation -
It is recommended that a bypass facility part on new location be constructed beginning on NC 75 west of Waxhaw, approximately 2250' east of Helms Road (SR 1300), and tying into Simonetti Drive at NC 16. There are several alternatives for this section of the bypass. They are displayed in Figure 7. The roadway will be a 24' two-lane paved shoulder section with limited access. The cost of this project is expected to be $ 3.9 million.

Transportation Demand -
NC 16 and NC 75 are major routes in the Town of Waxhaw that serve through traffic from South Carolina to Charlotte, as well as the local traffic in Waxhaw. NC 16 terminates when it intersects NC 75 in downtown Waxhaw. NC 16 is the only north/south route in Waxhaw while NC 75 is the primary east/west route. Volumes on NC 16 range from 7300 vpd near Twelve Mile Bridge to 11,000 vpd at the NC 75 intersection. Volumes on NC 75 west of NC 16 range from 7,000 vpd downtown to 4300 vpd west of the Waxhaw city limits. All vehicles coming from South Carolina are forced to go through downtown in order to get to their destination. The local traffic must use this section of roadway to go from the residential areas in the southwest to

the shopping areas on NC 16. This creates a heavy left turn demand off of NC 75 onto NC 16 at the one signalized intersection in Town. Refer to Figure 6 for the current and future volumes and turning movements at this intersection.

The eastbound left turning lane on NC 75 can "hold" three vehicles but must compete with the westbound through traffic in order to turn. With 1,900 vpd currently turning daily and 3,900 vpd expected in the year 2025 this can cause a major delay at the intersection. An added delay is the location of the railroad tracks, which forces vehicles to slow down in order to cross safely. This causes a "line of traffic" behind the turning vehicles. Since there is no room for widening or additional turning lanes and we can not remove the railroad tracks, the only solution is to remove traffic from this intersection. Section C of the Howie Parkway will remove approximately 2,500 vpd from both the eastbound left turn and the southbound right turn movement in the year 2025. This section of the bypass, if constructed, will have approximately 9,000 vpd using it. The volumes show that this facility will be used heavily as a bypass of the downtown area.

Capacity -

The capacity for NC 75 and NC 16 is approximately 13,000 vpd outside of the city limits. NC 16 downtown at the railroad crossing has a capacity of approximately 8,000 vpd and NC 75 has a capacity of 10,000 vpd. Currently in downtown, NC 16 is over capacity by 3,000 vehicles and eastbound NC 75 is under capacity. By the year 2025 at this intersection, NC 16 will exceed capacity by 13,000 vehicles and NC 75 will be over by 3,000 vehicles. There will be no flow of traffic in this area if nothing is done to improve the conditions. Widening the NC 75 corridor is not feasible because of the historic businesses, the downtown parking and the railroad track. Section C of the Howie Parkway would provide a bypass facility to remove both local and through traffic from downtown. If Section C is constructed it will allow NC 75 to operate under at only 70% of capacity, thus allowing ease of movement for motorists. If not constructed then NC 75 will be over capacity by 33%.

Safety Issues -

In the past three years there have been 21 accidents at the NC 75 & NC 16 intersection alone. Rear-end collisions or left turn sideswipes accounted for 18 of the accidents. The railroad track in the downtown area causes vehicles to slow down or stop immediately before/after making a turn at the signal. The potential for accidents because of the close proximity of the signal and the railroad is extremely high. Left turns at this intersection are the major movements and all of them must cross the railroad track, thus creating a safety concern with other motorists as well as the trains that come through. The Howie Parkway facility would cross the tracks as an overpass near NC 75, thus eliminating the rear-end collisions due to the difficulty in crossing the tracks and the eliminating the conflicts caused by the at-grade railroad track.

There is a lot of pedestrian traffic in Waxhaw's downtown area due to the local restaurants, antique stores and the on street parking. With the expected increase in traffic, the conflicts between vehicles and pedestrians will increase. Section C would reduce the number of vehicles in the downtown area and therefore reduce the conflicts between motorists and pedestrians.

Social Demands and Economic Activities -
The expected growth along NC 16 that was previously discussed also applies to Section C of the Howie Parkway. One major demand on the transportation system will be the future development of a casino by the Catawba Indians approximately 10 miles from Waxhaw. They have the permission to build such a site but are still working on the details. Once built though, it will encourage more traffic to travel through Waxhaw and add to the congestion along NC 75 & NC 16. Not only will the casino add more traffic to Waxhaw, it will also spur economic development along NC 75 west of NC 16. Currently, the growth along this section is slow. However, with the casino will come gas stations, fast food and more along NC 75. The bypass will allow people to get around the small downtown of Waxhaw and continue through to South Carolina. It will also encourage economic growth along the facility because of its location in Waxhaw. The facility will run next to Hickory Shopping Center and parallel a large undeveloped tract of 100 acres or more. The commercial and residential possibilities for this land are enormous. Section C of the Howie Parkway will get people into the main commercial area of Waxhaw from west of Town without forcing them through downtown. Currently, there is no room in downtown Waxhaw along NC 75 or NC 16 for economic development. The bypass section will allow for development because of the undeveloped land that surrounds it and its proximity to the existing commercial areas in Waxhaw.

Relationship of Howie Parkway Section C to Other Roadways in the Area -
Section C of the Howie Parkway is the final link in the bypass for Waxhaw. It is the only link that would allow the through travelers going from the north to the west to bypass the downtown area. If this section is not completed then the only east/west facility from South Carolina to Monroe will be NC 75 and through travelers as well as locals will still have to enter into the downtown area for every trip into Waxhaw. This bypass section will use part of existing location, thus reducing the cost of the project and not affecting the local movement of travelers in the area.

Priority # 5 - Old Providence Road (SR 1111)

Project Recommendation -
It is recommended that the section of roadway from Ethel Street to Essaw Road be widened for turn lanes into the elementary school. The northbound approach to the school needs a continuous "stacking lane" for cars that are waiting to turn into the school. The southbound approach needs a center turn lane to accommodate the left turning vehicles. The cost of this project is unknown due to the lack of details concerning the existing lane lengths and what traffic routing plans are settled upon.

Transportation Demand -
The commuters to Charlotte driving along Old Providence Road combined with the local school traffic makes for a heavily traveled roadway during the peaks times. The current volume in front of Waxhaw Elementary school is 5,800 vpd with year 2025 volumes expected to be 10,800 vpd. Since the elementary school was recently built that means it will be in use for some time. Therefore the demand along this section of Old Providence road will be consistent over the next

20-25 years. In order to make the flow of traffic in this area better additional lanes are needed in order to allow cars to wait in those lanes while people going through the area can travel without having to stop behind the school traffic.

Capacity-
The current capacity of this roadway is around 11,500 vehicles. In the year 2025 the roadway will be near its capacity and would require an alternative. The proposed bypass of this section will help eliminate most of the through traffic that is going to Charlotte or the other schools located south of the Waxhaw planning boundary. With the bypass built this section will be at about half of its 11,500 vehicle capacity and will be able to handle the 2025 traffic. Currently there is an extra right turn lane into the school but it does not handle all the traffic that needs to wait to turn into the school. This section needs to be extended in order to increase the capacity of the waiting lane as well as the efficiency of the through lanes in this area.

Social Demands & Safety -
The main social demand in this area is the elementary school with over 75 employees and 650 students. The baseball fields add to the social demand in this area as well as the sparse neighborhood developments. There is not much anticipated residential growth in this area but traffic will increase do to the northern residential areas with high growth and the fact that they must use Old Providence Road to get to the school.

The safety of adding the additional lane for stacking will make a safer route for both the school traffic and the through traffic in the area. Presently, the line for turning into the school does not allow other motorists to continue traveling on Old Providence Road without stopping and waiting. This causes people to get anxious and they attempt to go around the stopped vehicles and it created potential safety hazards.

The addition of a continuous center turn lane from Ethel Street to the school entrance and extending the existing right turn stacking lane from the school entrance to Essaw Road will improve the safety conditions for every motorist that uses Old Providence Road.

Priority # 6 - Waxhaw-Marvin Road (SR 1301)

Project Recommendation -
It is recommended that SR 1301 be widened to a two lane 24' with paved shoulders section from SR 1300 (Helms Road) to SR 1304 (Pineoak Road). Waxhaw-Marvin Road is currently two 9' lanes. This section of roadway is approximately 2/3 mile long and it is estimated that the cost of widening this section is $775,000.

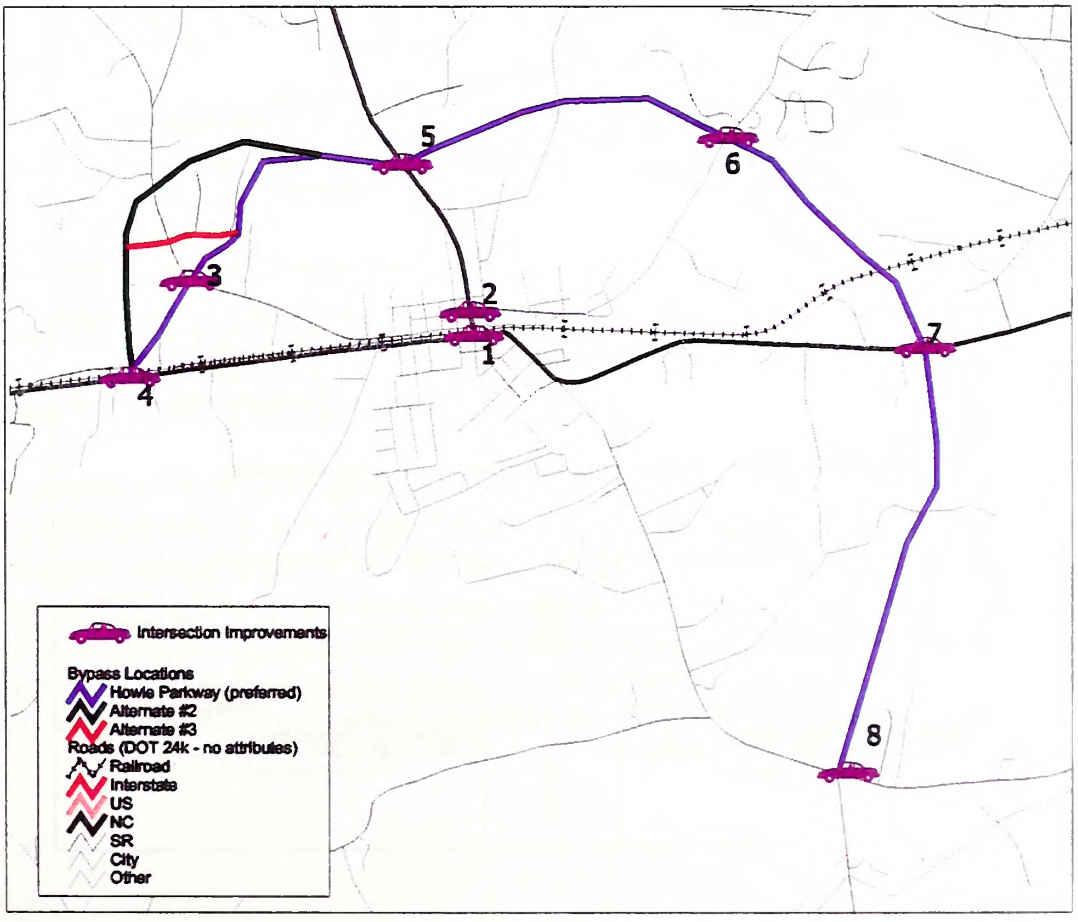
Reasons for Widening -
Waxhaw-Marvin Road is a major thoroughfare that carries mainly local traffic into and out of Waxhaw. In 1997 the volume was around 2,200 vpd. With the addition of the Howie Parkway and the growth in the area the 2025 volumes are expected to be 3,900 vpd. Although the capacity of this facility is 8,000 vpd the width of the driving lanes are undesirable.

At 45-55 mph in this section, it is important for motorists to have ample room for maneuvering. By bringing this facility up to the standard 12' lanes with shoulders it will increase the safety of drivers by allowing room for driver errors without any dangerous repercussions. The widening will also increase the capacity of the road to 13,000 vpd, thus leaving enough capacity to handle a large increase in traffic well past the 2025 planning boundary. The residential growth in this area is slow and expectations are for this trend to continue. This radial facility will intersect the proposed Howie Parkway and could experience some commercial growth due to the bypass. If this facility is not widened it will not increase the level of congestion on SR 1301 but it could effect the safety of motorists due to the small lane widths and the added number of vehicles.

Intersection Improvements

Along with the roadway projects described in this section, there are intersection improvements that need to be discussed. The intersection improvement recommendations described in the remainder of this section are preliminary estimates about how these intersections can be improved. Each intersection will have to be evaluated individually in detail to determine the exact geometrics, lane configurations and overall operational efficiency of the intersection. The final design of each of these intersections is up to the Division Engineer and the Highway Design Branch of NCDOT and will be determined once the design of the roadways is completed. Figure #7 shows the locations of the recommended intersection improvements.

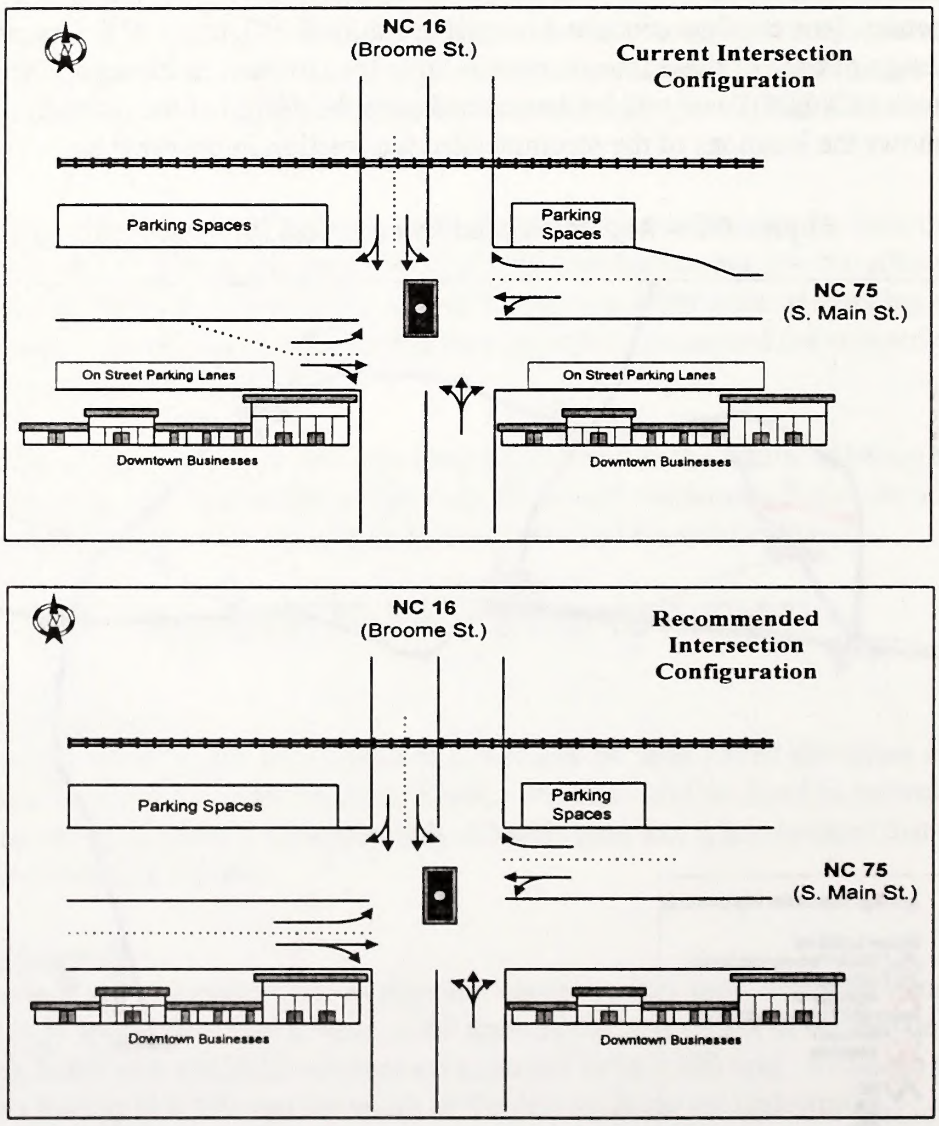
Figure # 7 - Recommended Intersection Improvements



Intersection # 1 - S. Main St. & Broome St. (NC 16 & NC 75)

At this intersection there is not a lot of space available for improvements like widening, however if the on street parking is removed on one side of the street then two longer turn lanes can be put in place. Since downtown parking is needed for the local businesses, the parking spaces located north of NC 75 would be left in place. The parallel spaces located directly on NC 75 should be removed so that people have more room to maneuver when turning onto NC 75 and so that a better eastbound through lane can be added at the intersection. Currently, motorists who are traveling eastbound must go around parked cars when trying to go through the intersection and the left turning vehicles merging into the short turn lane slows down the through traffic. The elimination of the on street parking would make the main downtown intersection more efficient for motorists. Figure 8 shows the proposed intersection improvements.

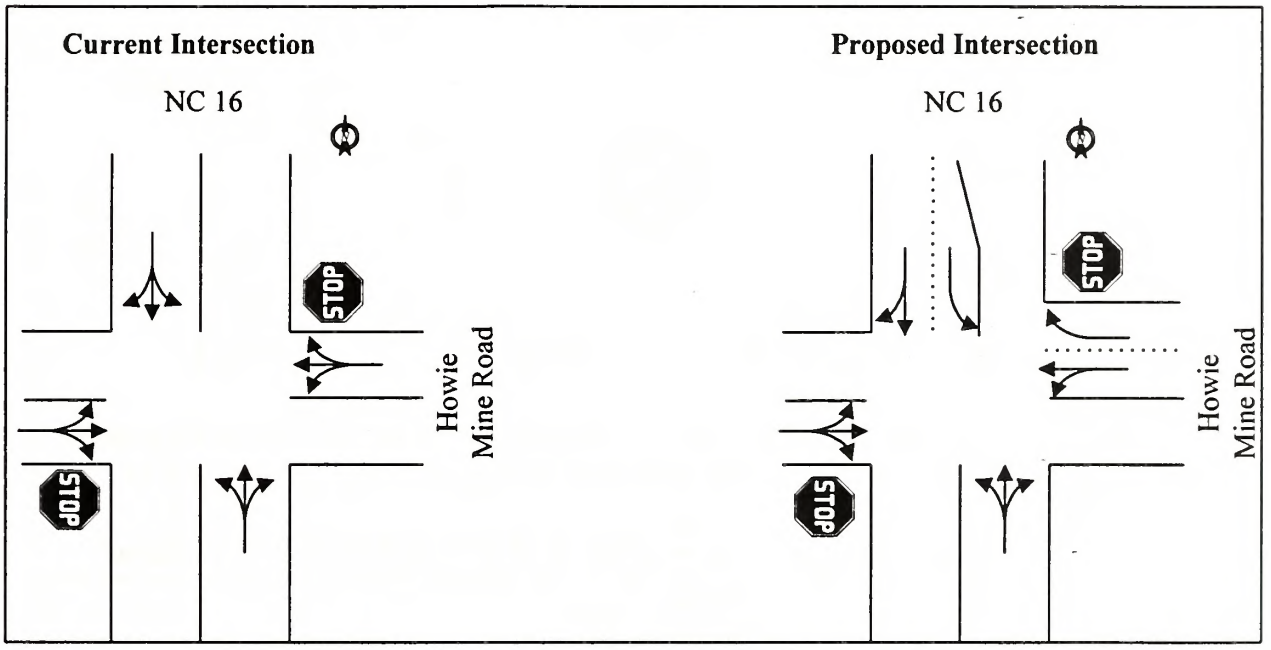
Figure 8 - NC 16 & NC 75 Intersection Improvement



Intersection # 2 - Broome St. & Howie Mine Road (NC 16 & SR 1008)

This intersection has delay problems because of the lack of a traffic signal and proper turn lanes. Currently, motorists traveling on NC 16 must wait behind left turning vehicles. Due to the high volume of opposing traffic this turn may take some time and motorists are forced to wait behind turning vehicles. The people turning off of Howie Mine onto NC 16 share the same lane to make left and right turns. The motorists making right turns often have to wait behind the left turning vehicles. Therefore, the recommendation for this intersection is to put in turn lanes on the southbound and westbound approaches. There is enough right of way on NC 16 to add the left turn lane and there is also room for widening on Howie Mine at this intersection to add a short right turn only lane. Figure 9 shows the improvement recommendation.

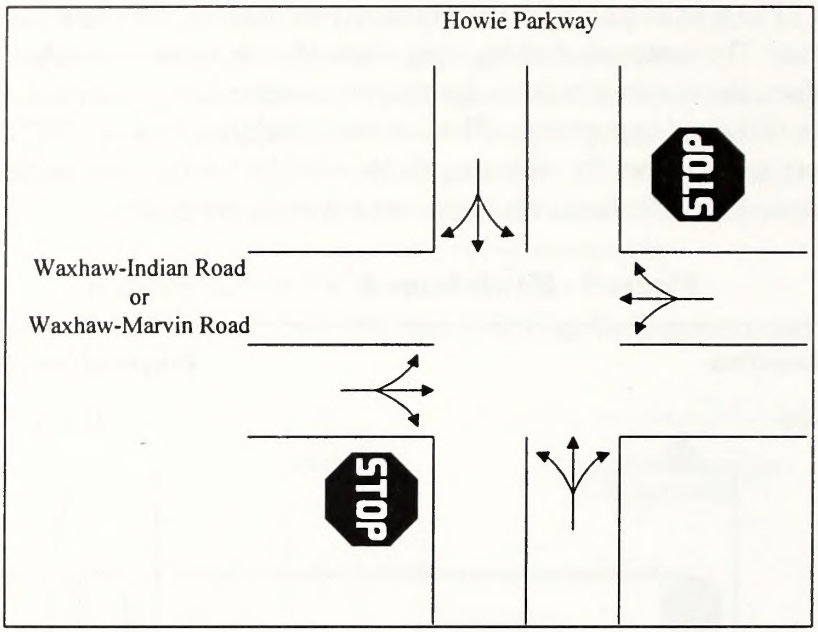
Figure 9 - Howie Mine & NC 16 Intersection



Intersection #3 - Howie Parkway and Waxhaw-Marvin Road (SR 1301)
&
Intersection #6 - Howie Parkway and Waxhaw-Indian Road (SR 1008)

Currently, neither of these intersections exist, but once the proposed Howie Parkway is completed Waxhaw-Marvin & Waxhaw-Indian roads will become intersections along the bypass. Due to the lower volume of traffic that will exist on these two roads, the bypass will get the continuous movement through the intersection and the other "legs" of the intersection will be controlled by stop signs. By using stop signs at these two intersections the efficiency of the bypass increases because there are less signals in operation along the route. These intersections will be similar in design so they are both shown as the same intersection in Figure #10.

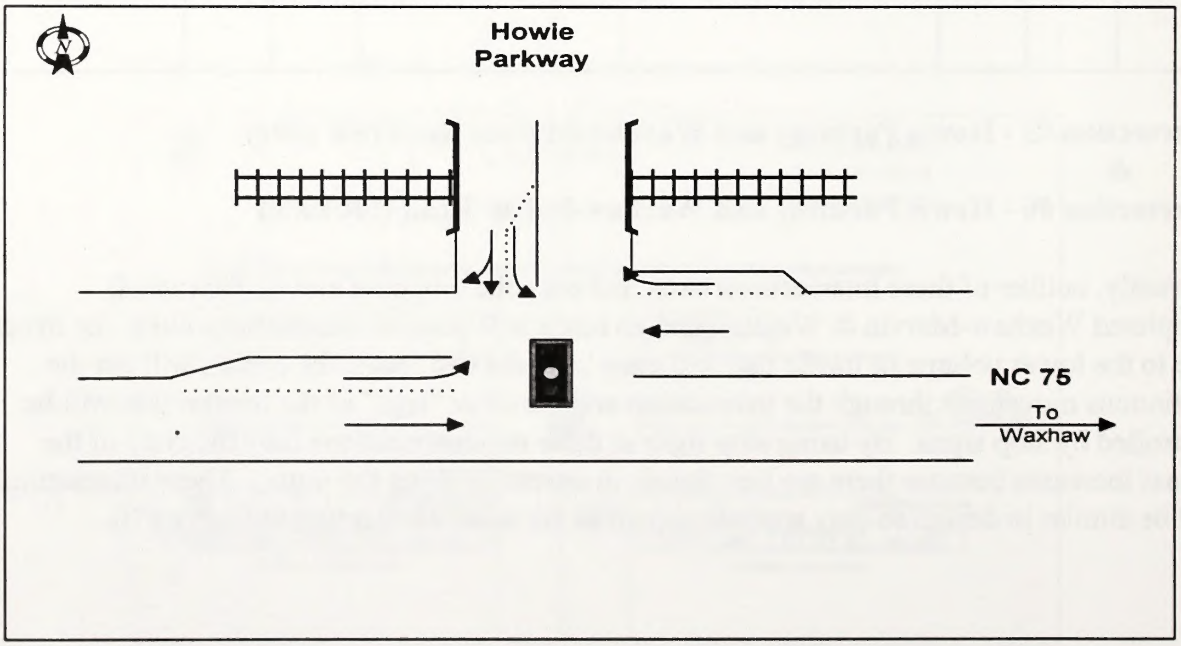
Figure 10 - Intersection Improvements for Waxhaw-Marvin Road & the Howie Parkway and Waxhaw-Indian Road & the Howie Parkway



Intersection #4 - NC 75 & Howie Parkway (west of Town)

This intersection crosses over the railroad track that is adjacent to NC 75. It may be possible to use stop sign control at this intersection but it is shown as signal controlled in Figure 11.

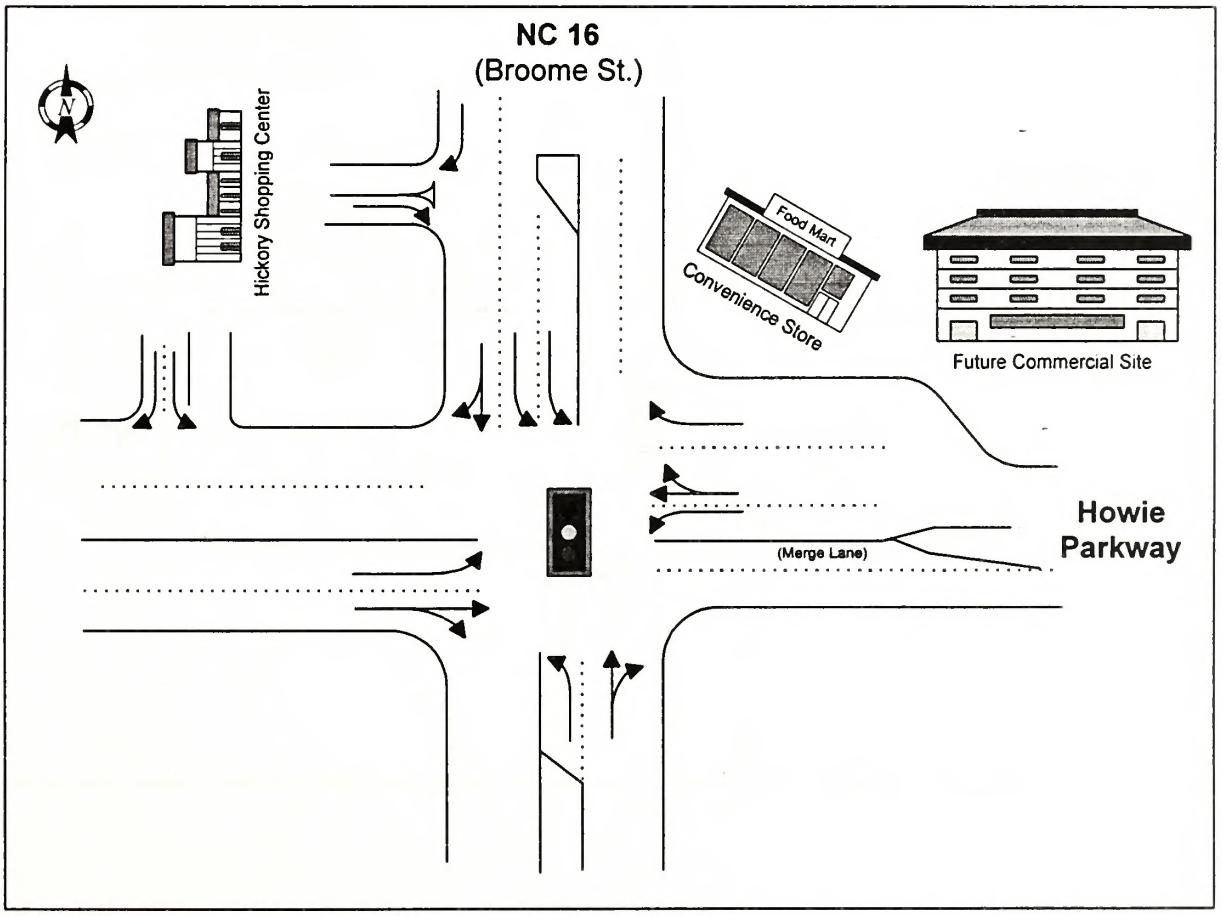
Figure 11 - Intersection Recommendation for NC 75 and the Howie Parkway



Intersection #5 - NC 16 & Howie Parkway

This intersection will have the heaviest amount of traffic in the Town of Waxhaw once the bypass is built. This intersection will serve as the "transition location" in Waxhaw instead of the current NC 16 & NC 75 intersection. Transition meaning that people will decide where they want to go in Waxhaw based on this intersection. Do they want to go around Waxhaw to the east or west or into downtown or shopping? Those decisions are made at this intersection and therefore this will be the most important intersection in Waxhaw. It is important that the land surrounding this intersection be protected carefully because of the number of lanes that will most likely be needed. Two left turn lanes on the southbound approach of the intersection will be needed in the future to handle the number of vehicles turning onto the bypass. Since the bypass is only two lanes, a merging lane will have to be included in order to accommodate the dual left lanes. The anticipated design of the intersection is shown in Figure 12. Again this design may change once a detailed capacity analysis is performed on this intersection.

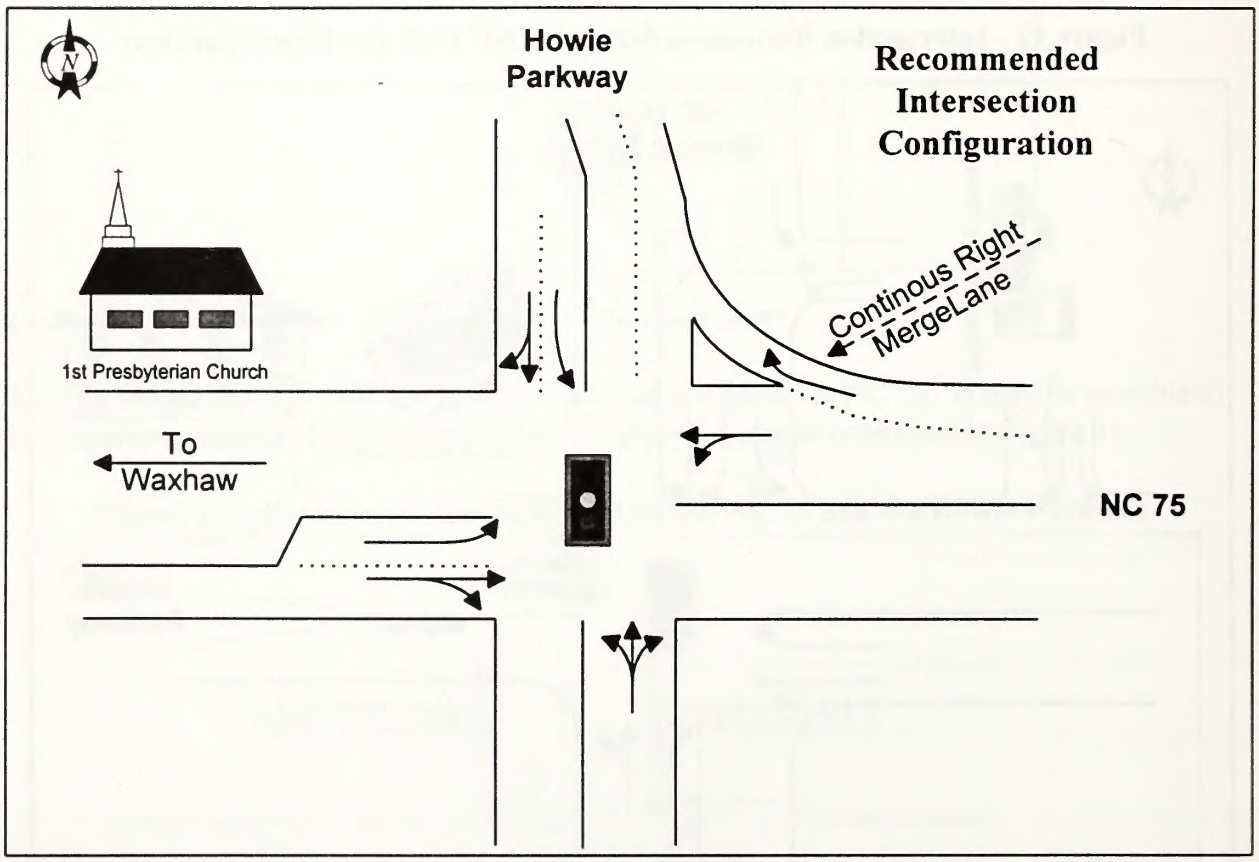
Figure 12 - Intersection Recommendation for NC 16 & the Howie Parkway



Intersection #7 - Intersection Recommendation for NC 75 and Howie Parkway (East of Town)

This intersection is located on NC 75 east of the current Waxhaw Town limits. This intersection will have a large number of left hand turns off of NC 75 onto the bypass as discussed in section 2 of the report. Therefore, it is proposed to have a continuous right hand traffic lane from NC 75 onto the bypass to allow for better traffic movement. This intersection is located just south of the railroad tracks and located next to 1st Presbyterian Church so careful design considerations must be followed in order to avoid the church and still be able to provide a bridge over the railroad tracks. This intersection would be controlled by a signal in order to assure safety for the large number of left hand turns at this intersection.

Figure 13 - Intersection Recommendation for NC 75 & the Howie Parkway (East of Town)



Intersection # 8 - Howie Parkway Section B & Old Waxhaw-Monroe Road

This intersection will be a standard four legged stop sign controlled intersection. The through movement will be from Providence Road onto the bypass facility. The current location of the Providence Road and Old Waxhaw-Monroe Road intersection needs to be moved to account for stopping distance and to tie into the location of the Howie Parkway. The proposed intersection configuration and the actual location of the new intersection are shown in Figures 14 & 15.

Figure 14 - Parkway Section B & Old Waxhaw-Monroe Road

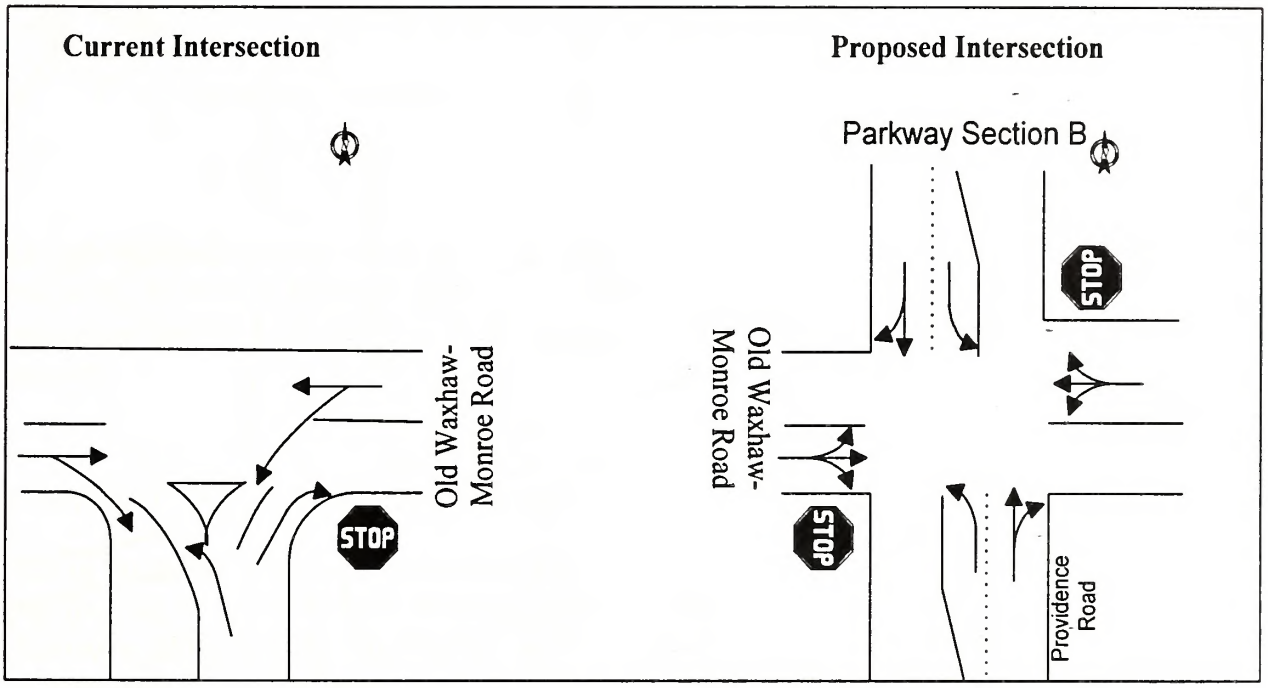
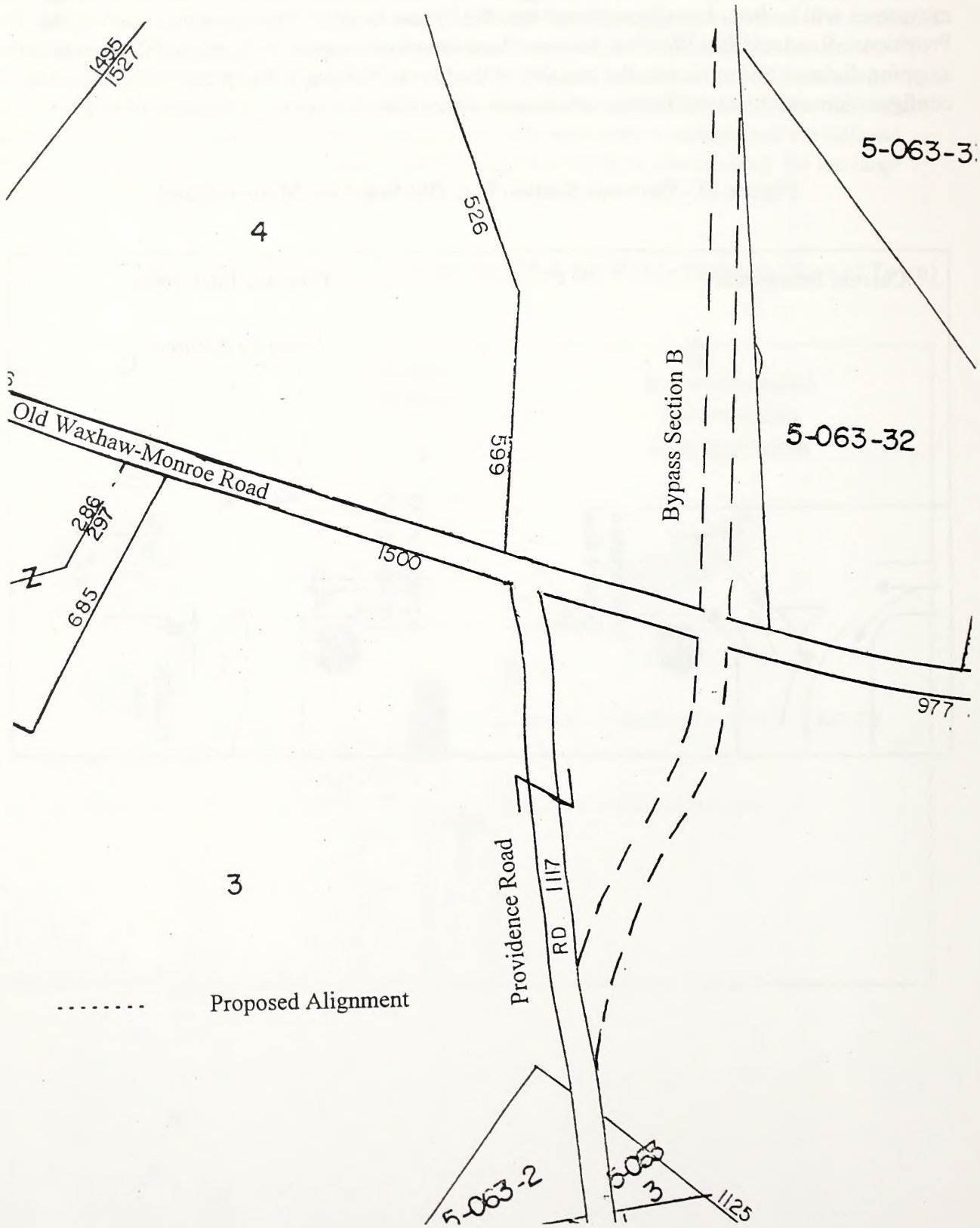


Figure 15 - Proposed Alignment of Bypass Section B & Providence Road



Chapter 3 - What Impacts Does the Plan Have on Waxhaw??

In the previous sections we discussed how the Waxhaw Thoroughfare Plan would handle the transportation issues like congestion and safety, and briefly discussed the economic and social impacts of the plan. However, previous sections did not answer in detail the following questions:

1) What environmental impacts will the plan have?

2) How many businesses or homes will be affected?

3) What economic development potential does this plan offer?

4) What are the benefits (travel time, safety costs, operating costs) of this plan?

This section of the report will focus on the "impacts" that the thoroughfare plan will have on the residents, the land and the overall community atmosphere in the Town of Waxhaw. Only the impacts of the NC 16 widening and the three sections of the Howie Parkway are discussed in this chapter.

What will "the Plan" do to the current environment in Waxhaw?

One of the major concerns with the development of a transportation plan is the effect the plan will have on the environment. Meaning, will it go through wetlands, cross streams, historic districts or affect wildlife, endangered species? Figure 16 displays the relationship of the recommended roadway improvements to the environmentally critical areas in Waxhaw. This figure shows that the widening of NC 16 and the new Howie Parkway facility will not have any negative environmental impacts on wetlands, endangered species or historic districts. Table 1 displays the actual impacts on an individual project basis. All of the main environmental areas have zero's displayed in the chart, thus there will be no foreseen environmental impacts.

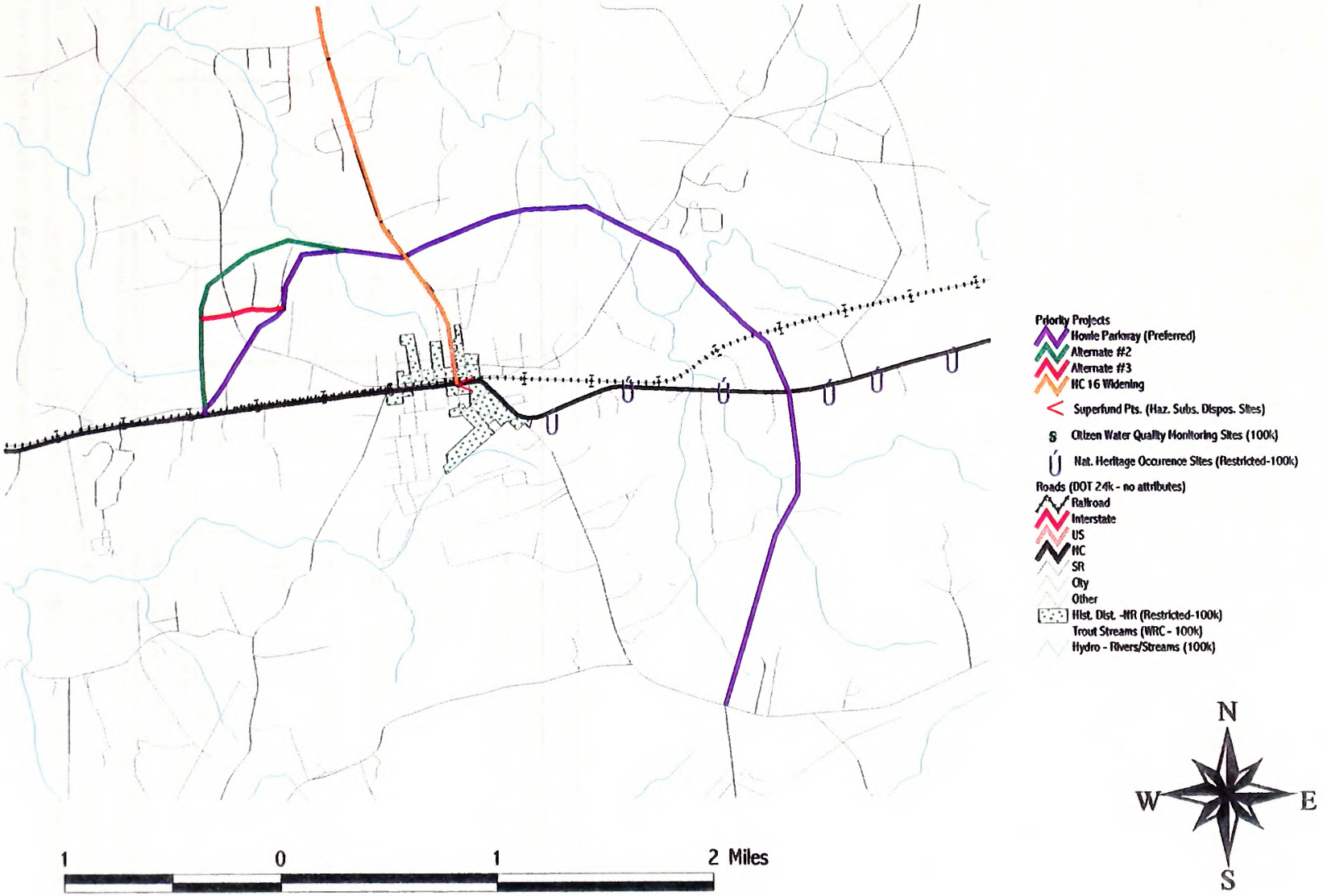
Table 1 -Environmental Impacts for Thoroughfare Plan Projects

Category	Howie Parkway (Section A)	Howie Parkway (Section B)	Howie Parkway (Section C)*	Widening of NC 16 (120' ROW Assumed)**
Length (Miles)	1.75	1.50	1.30	1.93
(Kilometers)	2.82	2.42	2.10	3.11
Wetlands (acres)	0	0	0	0
Protected/Critical Watershed (acres)	0	0	0	0
High Quality Water Zones (acres)	0	0	0	0
Nurseries/Spawning Areas	0	0	0	0
Hydrologic Crossings				
Normal	2	3	1	1
Trout	0	0	0	0
Critical Habitats	0	0	0	0
Special Natural Areas	0	0	0	0
National Heritage Occurances	0	0	0	0
Historic Sites (NR & Candidate)	0	0	0	0
Historic Districts	0	0	0	0
Archaelogical Sites/Areas	0	0	0	0
Cultural Resources:				
Schools	0	0	0	0
Parks/Community Facilities	0	0	0	0
Churches	0	0	0	0
Cemetaries	0	0	0	0
Subdivisions	0	0	0	
Superfund Sites/Landfills	0	0	0	0
Groundwater Incidents	0	0	0	0
NPDES Dischargers	0	0	0	0
Non-discharge systems	0	0	0	0

* The numbers for this portion of the bypass are based on the preferred alignment

** Widening of NC 16 is 1.44 miles to 5 lanes & .49 miles to 3 lanes

Figure 16 - Environmental Impacts of the Roadway Improvements



How many homes will be effected?

Most citizens in a town are concerned about their property and what will happen to their house or land when a transportation plan is implemented. They want to know if it effects their property and if so, how much are they going to lose? Each one of the top four priority projects on the thoroughfare plan were analyzed to see how many homes and businesses would be impacted. The results are displayed in Table 2 . It is important to see that almost all of the commercial areas that are impacted all include right-of-way that has been donated by the commercial developer so that it would minimize the impact to their property. Approximately 22.67 acres of open/wooded or unused property will be effected by the proposed projects. This reduces the impact on actual residential homesites and will ultimately reduce the cost of the projects and make justifying the protection of the corridors easier. Approximately 15.87 acres of residential land are impacted while only 6 houses will be taken with the completion of all four projects. With the relatively large amount of new construction in this plan these are very minimal affects to property owners in the Town of Waxhaw.

Table 2 -Housing and Property Impacts for Thoroughfare Plan Projects

Category	Howie Parkway (Section A)	Howie Parkway (Section B)	Howie* Parkway (Section C)	Widening of NC 16** (120' ROW Assumed)
Length (Miles)	1.75	1.50	1.30	1.93
(Kilometers)	2.82	2.42	2.10	3.11
Number of Intersections	3	2	3	6
Number of Railroad Crossings	1	0	1	0
ROW to be Acquired (acres)				
Open Land	11.00	5.50	3.49	2.68
Residential	3.50	6.80	2.57	3.00
Commercial	9.60	2.20	3.31	1.28
(Amount Already Dedicated Privately)	(9.60)	(2.20)	(3.31)	(0.00)
Estimated Relocations:				
Residential	0	1	1	4
Business	0	0	0	0
Farms	0	0	0	0
Number of Houses Within 50' of the Right-of-way	0	2	9	8

* The numbers for this portion of the bypass are based on the preferred alignment (blue) in Figure 12

** Widening of NC 16 is 1.44 miles to 5 lanes & .49 miles to 3 lanes

Table Note: Sections B & C are assuming an 80' Right-of-Way for the Length of the Project

Section A assumes 120' Right-of-Way for 2/3 mile(commercial area) and 80' Right-of Way for the Rest of the Section

As with any new roadway facility there will also be proximity impacts to residents in the area. Houses may now be located within 50 to 100 feet of the right-of-way (ROW) of the new road. Although minimal, a resident located within 50' of the ROW will still be impacted by noise, congestion and it may not be aesthetically pleasing to see a major roadway from your front porch. Sections B & C of the Howie Parkway will have the biggest impact on property owners, so aerial photos of those two sections with property lines(in yellow) and the approximate location of the roadways are displayed in Figures 17 & 18. These photos give a better visual representation as to the effects that the new roads will have on property owners in these areas. It is important to realize that the location of the road shown on the photos is a preliminary location and it will be evaluated and finalized in latter stages of the planning/construction process.

Property Impacts from Section B of the Howie Parkway

The number one (1) on Figure 17 designates that the portion of the bypass that goes through that property will be reserved by the property owner, nothing built on it. Number two (2) designates that this property owner likes the location of the roadway and would be willing to work with the Town and state when it comes time to build the facility. Those two pieces of property are a large portion of Section B of the bypass, therefore the impacts to citizens in this area are minimal. Approximately 2 houses will be within 50' of the ROW for this section of the bypass.

Property Impacts from Section C of the Howie Parkway

This section of the bypass will create the largest hurdle when it comes time for design of the road. Figure 18 shows the three different alignments that have been discussed with citizens and the Town of Waxhaw. The blue alignment is considered the North Carolina Department of Transportation's preferred alignment because of its use of existing roadways, cost and volume of traffic that will use the facility if it is in this location. Table 3 shows the comparison of impacts for the three alternatives for Section C of the Howie Parkway. The blue alternative has the least number of relocations and stream crossings but does have the highest number of houses within 50' of the right of way. There are varying levels of impacts to houses and property for each of the four main projects. These impacts will be considered and citizens can voice their opinion about the final location of the projects when the environmental assessment of the project is underway.

Table 3 - Impacts of Section C Alternatives

	Blue Alternative	Green Alternative	Red Alternative
Length (miles)	1.30	1.52	1.49
Estimated Relocations	1	3	4
Stream Crossings	1	3	1
Number of Houses within 50' of Right-Of-Way	9	3	5
Approximate Cost	3,980,000	4,960,000	4,400,000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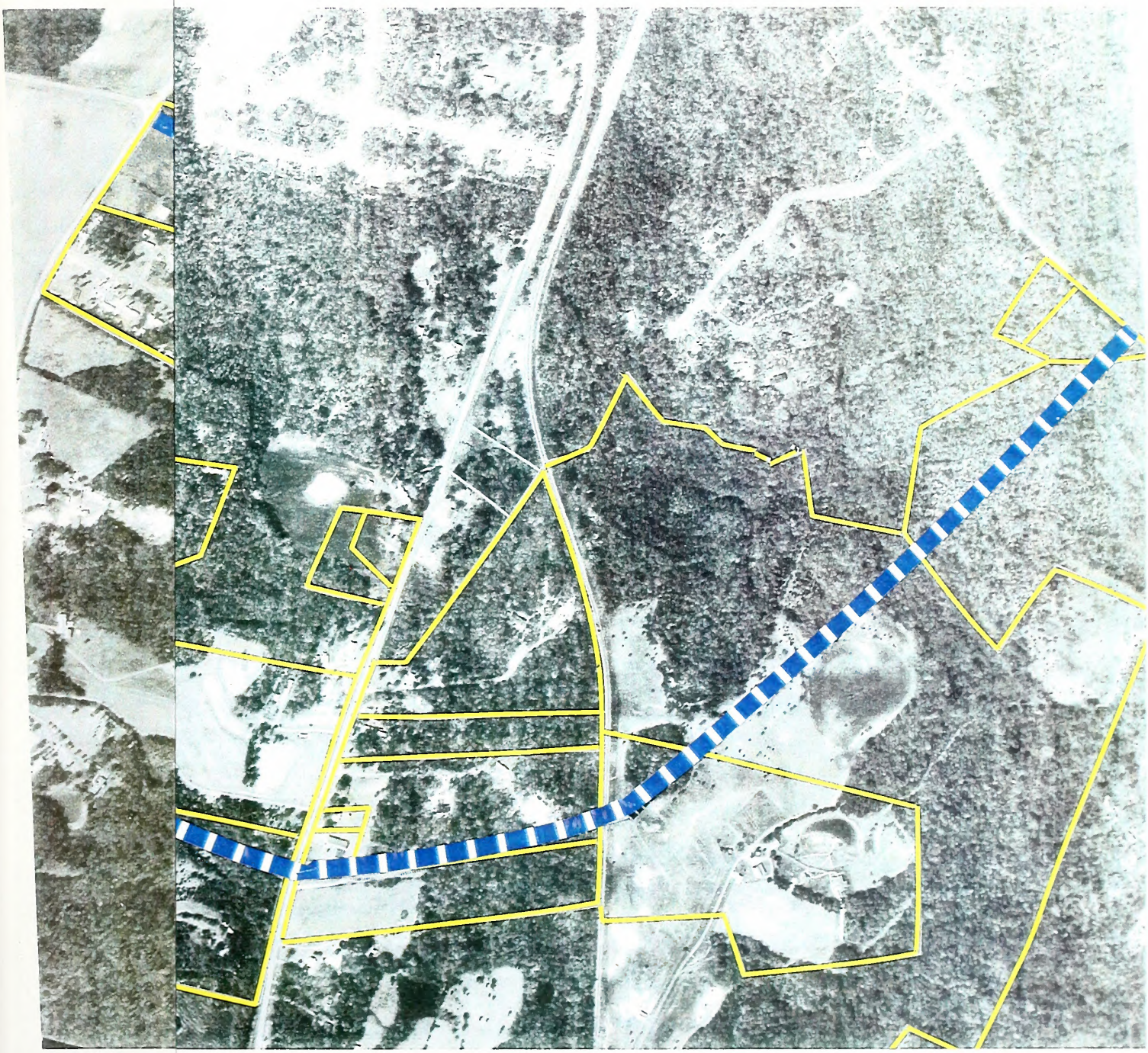
the Howie Parkway



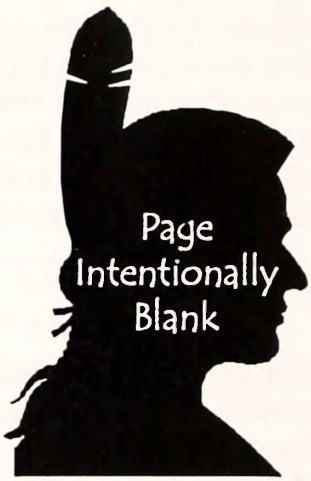

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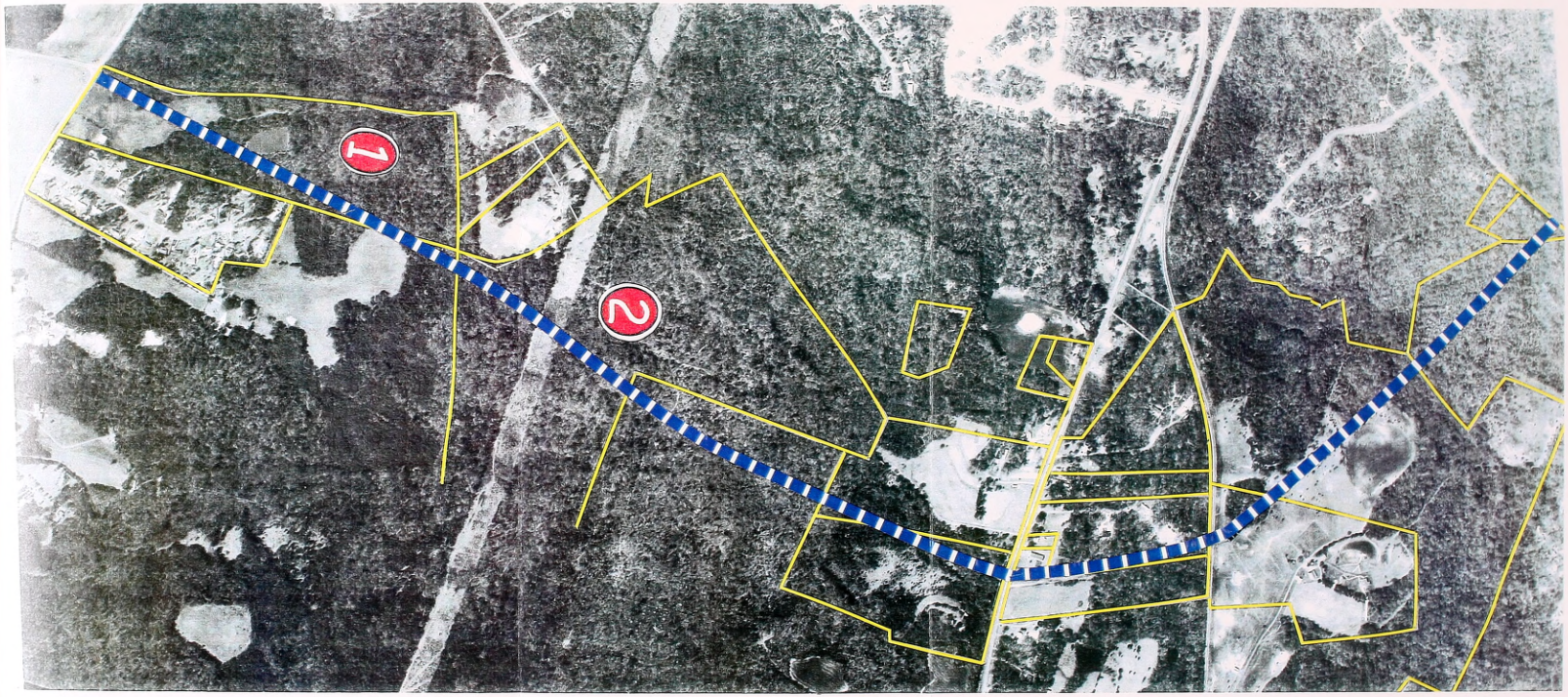
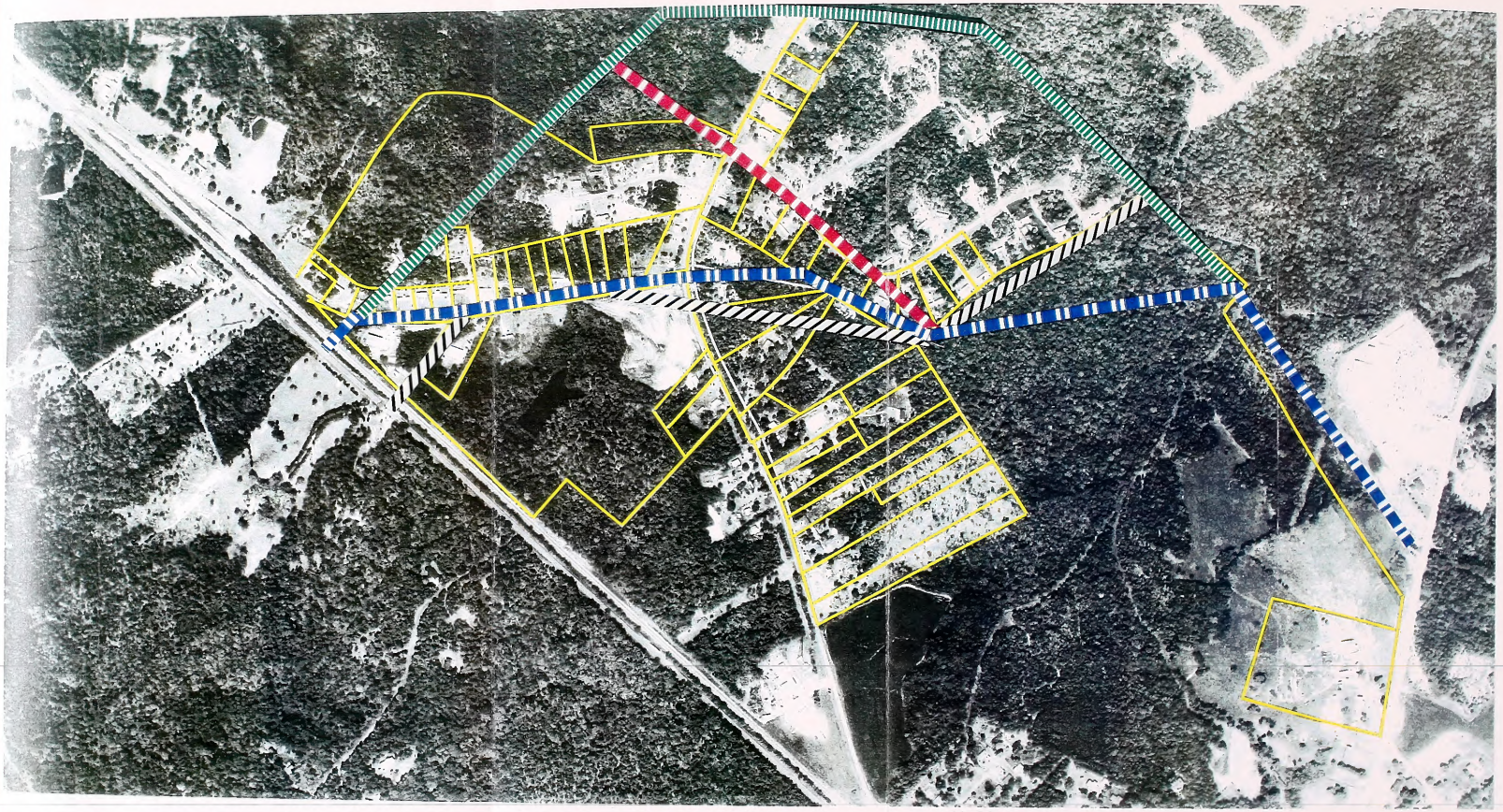
Figure 17 - Aerial Photo of Section B of the Howie Parkway



the Howie Parkway

Figure 18 - Aerial Photo of Section C of the Howie Parkway



How is "the plan" going to help economic development?

Although roads are built to relieve congestion and to get people where they need to go, they also can impact the economic growth of an area by reducing transportation costs and providing access to land that has development potential. For the Town of Waxhaw, the new roadways that are proposed on the thoroughfare plan will have a major impact on economic development in Waxhaw. The land that surrounds all of the new facilities will begin to develop commercially and residentially because of the prime location of the land and the availability of undeveloped land in the area where the new roads will be located. Property owners will look for ways to develop their land adjacent to the road and this will be a definite economic benefit to the Town of Waxhaw. The availability of land surrounding the proposed Howie Parkway increases the possibility of economic development for the Town of Waxhaw. Not only will these new roadway facilities promote development, they will bring jobs, increase the tax base of the Town and at the same time provide a better living environment for the Town of Waxhaw.

For example: Currently Hickory Grove Shopping Center is the main commercial area in Waxhaw and citizens are forced to travel along NC 16 to get to this area. With the addition of the bypass facility connecting next to this commercial area people will be able to take these new routes to get to the commercial area. Since a large number of people will be traveling on these new roads, the property that is adjacent to the new road will become very good commercial real estate for gas stations, restaurants and more. These new businesses will need employees and Waxhaw residents are the most likely candidates. It is reasonable to assume that a lot of these new commercial establishments will be inside the Town limits and that will create a larger tax base for the Town of Waxhaw. The economic impact of building new roads has already begun to take effect in Waxhaw. Here are a few of the recent economic impacts along the bypass corridors (Figure 19 also gives the relative location):

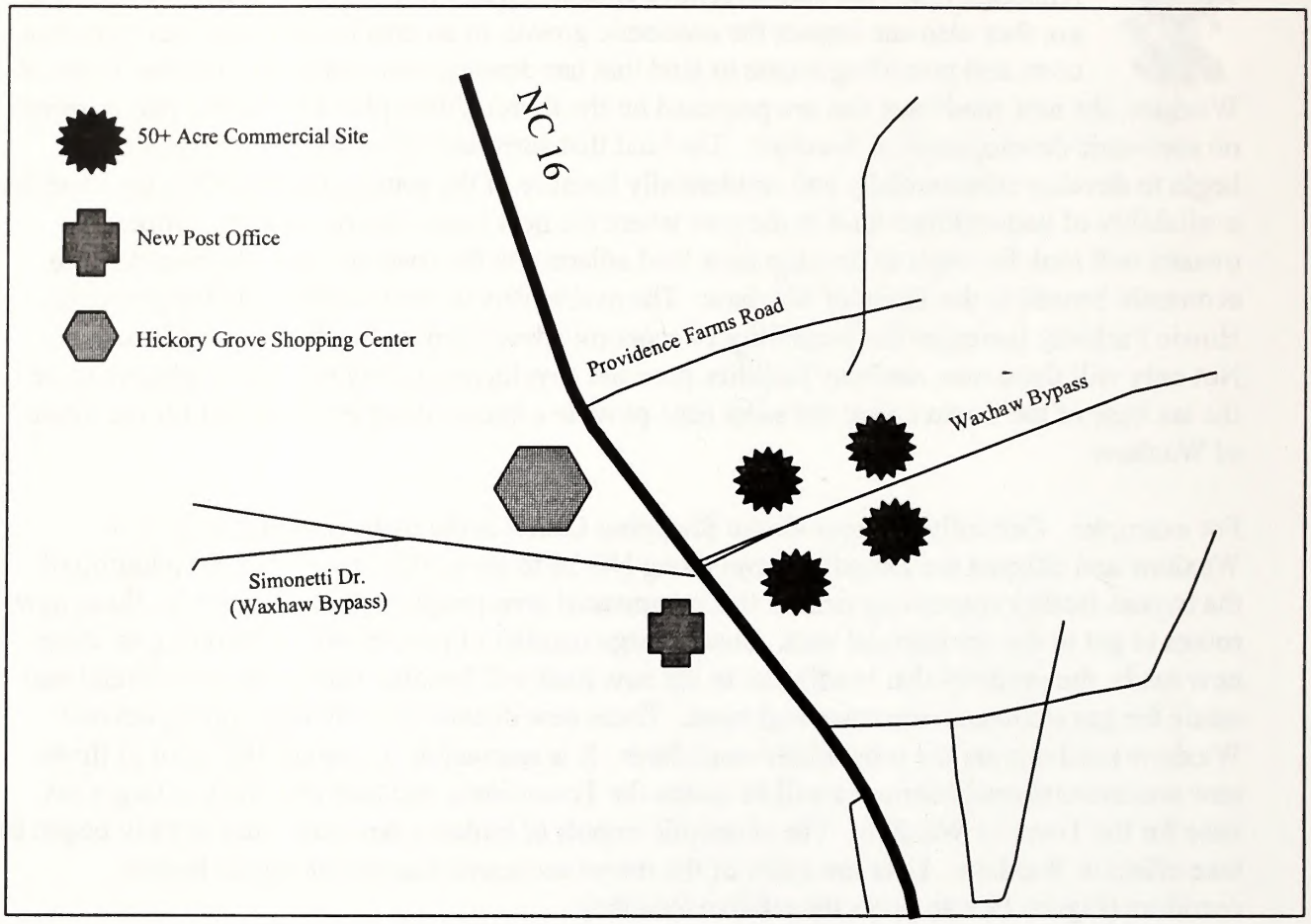
1) a new post office is getting ready to be placed west of NC 16 at the corner of where the bypass comes through

2) a 50+ acre commercial development is being established across from the existing shopping center and will be on both sides of the proposed bypass

3) a large tract of land located across from Providence Road (SR 1117) is going to begin to be sold residentially and commercially due to the location of the bypass

4) a large tract of land (50+) acres is expected to be sold for residential development by a Waxhaw resident once the bypass is built

Figure 19 - Recent Economic Impacts Along the Bypass Corridor



How Much in Travel Time, Accident Costs & Operating Costs Will the Projects Save??

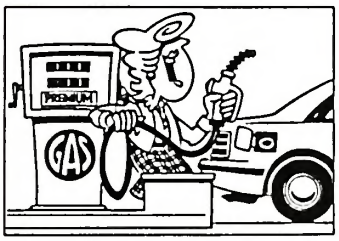
Each project that is proposed in the thoroughfare plan needs to be evaluated to see what kind of benefits it will provide to the transportation system and its users. The benefits that are provided range from a reduction in the total number of miles or hours traveled by motorists to a reduction in accident costs and increases in speed. The benefits of the four top priority projects are shown in Table 4.

The benefits are calculated by determining how many people are using the existing roads and how many of them would "switch" and use the new facility if it was built. The benefits that are listed in Table 4 are only the benefits that the people using that road would experience. However, it is important to realize that other roads in Waxhaw will benefit from the proposed projects and that the benefits on the other roads are not included in the table. For example, if Section A of the bypass is built the benefits in Table 4 are for the users on NC 16 & NC 75. However, other roads like Howie Mine and N. Main Street would get some reduction in traffic or a benefit from the project but they are not accounted for in the benefit table.

Table 4 - Benefits of Thoroughfare Plan Roads in Waxhaw

Road Project	Accident Costs	Increase in Speed (mph)	Person Time Costs	Vehicle Hours Traveled	Operating Costs	Vehicle Miles Traveled	Total Benefits (Millions)
Howie Parkway Section A	2.97	13	16.77	1.51	4.51	16.2	24.25
Howie Parkway Section B	1.33	7	5.88	0.53	0.64	-0.75	7.85
Howie Parkway Section C	3.21	11	20.91	1.88	6.01	25.5	30.13
NC 16 Widening	7.38	4	29.45	2.65	8.64	42.5	45.47

**Table Note - All of the costs shown in the chart are decreases and are displayed in Millions



Using less gasoline is a Benefit!

Increasing my traveling speed is a benefit!

Figure 20 is a flowchart example showing the basic meaning or "concept" behind the benefits that are determined for each project. The flowchart on the next page describes the benefits for Section A of the bypass and how they were achieved.

Scenario: People traveling from Hickory Grove Shopping Center to Monroe.
Current Path of Travel: South on NC 16 through downtown to NC 75.
Left turn onto NC 75 and continue to Monroe.
New Travel Path: Travel on Section A of the bypass to NC 75
Left turn onto NC 75 and continue to Monroe.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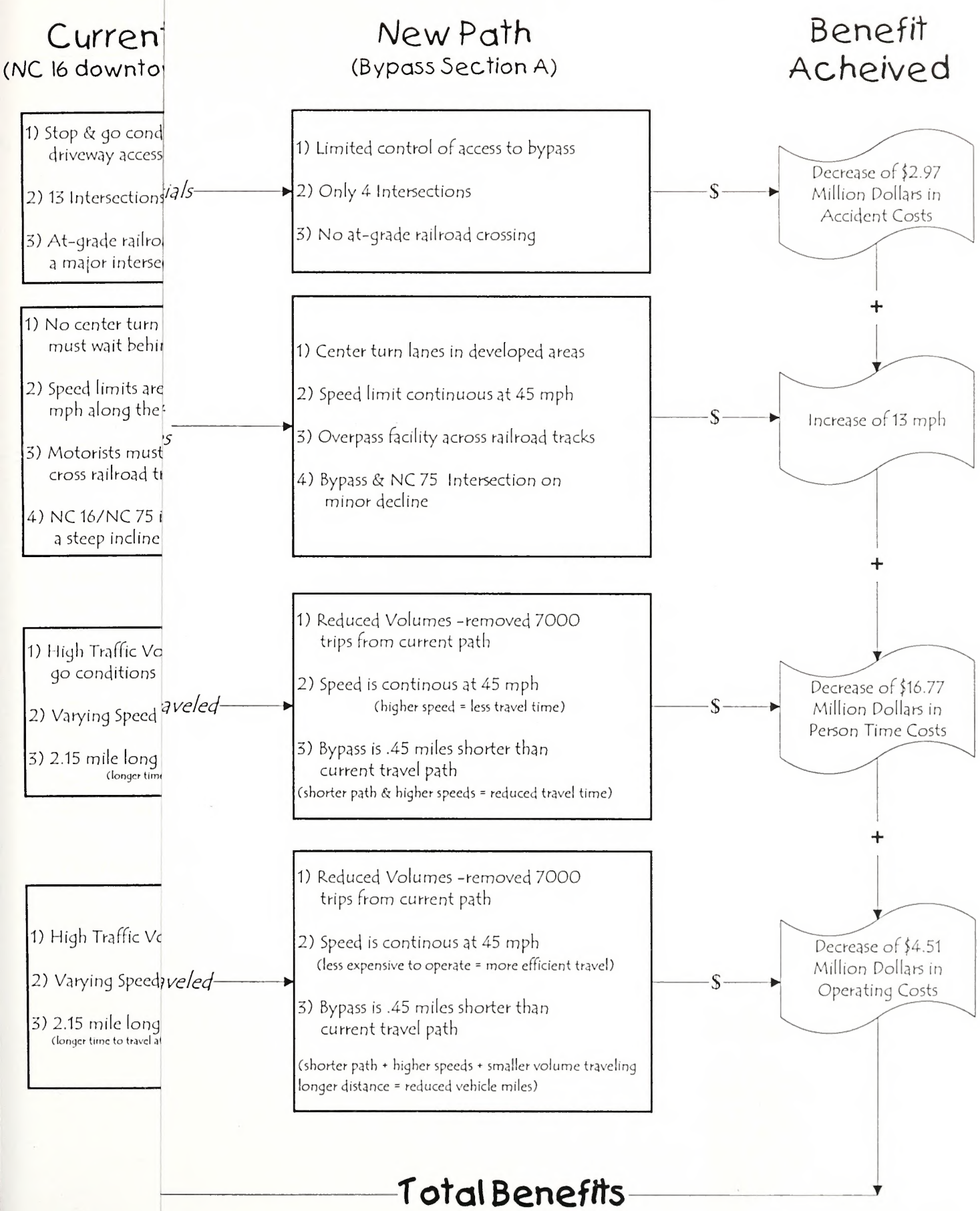
Curren
(NC 16 downto
New Path
(Bypass Section A)
Benefit
Acheived
1) Stop & go cond
driveway access
2) 13 Intersections
3) At-grade railro
a major interse
ials
1) Limited control of access to bypass
2) Only 4 Intersections
3) No at-grade railroad crossing
$
Decrease of $2.97 Million Dollars in Accident Costs
+
1) No center turn
must wait behi
2) Speed limits are
mph along the
3) Motorists must
cross railroad t
4) NC 16/NC 75
a steep incline
s
1) Center turn lanes in developed areas
2) Speed limit continuous at 45 mph
3) Overpass facility across railroad tracks
4) Bypass & NC 75 Intersection on minor decline
$
Increase of 13 mph
+
1) High Traffic Vo
go conditions
2) Varying Speed
3) 2.15 mile long
(longer time
aveled
1) Reduced Volumes -removed 7000 trips from current path
2) Speed is continous at 45 mph
(higher speed = less travel time)
3) Bypass is .45 miles shorter than current travel path
(shorter path & higher speeds = reduced travel time)
$
Decrease of $16.77 Million Dollars in Person Time Costs
+
1) High Traffic Vo
2) Varying Speed
3) 2.15 mile long
(longer time to travel a
veled
1) Reduced Volumes -removed 7000 trips from current path
2) Speed is continous at 45 mph
(less expensive to operate = more efficient travel)
3) Bypass is .45 miles shorter than current travel path
(shorter path + higher speeds + smaller volume traveling longer distance = reduced vehicle miles)
$
Decrease of $4.51 Million Dollars in Operating Costs
Total Benefits


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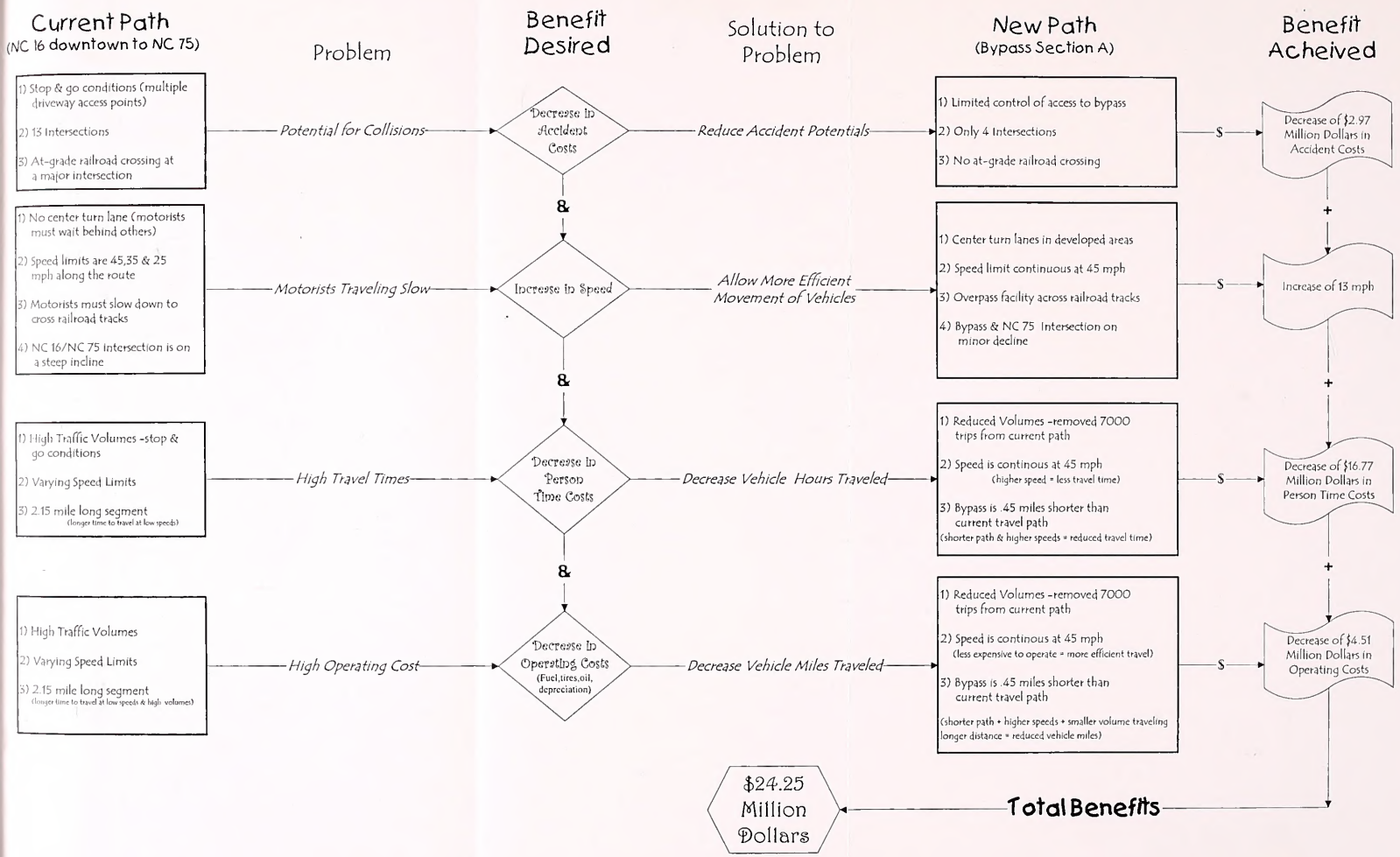
Figure 20 - Benefits Flowchart



Chapter 4 - Implementation of the Plan

Implementing "the plan" that has been developed for the Town of Waxhaw is a challenging, but necessary part of the planning process. After all, if we do not try and build the new roads or improve intersections, then there is really no need in developing the thoroughfare plan. As discussed in Chapter 1 of the report, planning is a continuous process that is only successful if corridors are protected, development is controlled and funding is obtained in order to fulfill the needs identified on the plan.

The primary function of the Town of Waxhaw's thoroughfare plan is to provide guidance to the governing bodies of the Town in developing its highway system. It is the responsibility of the Town to provide citizens with the most effective transportation system possible by utilizing the legislative powers that are granted to the Town of Waxhaw and by maximizing all the resources that may be available. Due to the increase in construction costs and a low amount of revenue available for highway projects, problems in meeting the highway funding needs of smaller towns is increasing. There are not sufficient funds in the state or local government budgets to undertake all of the projects in an area and so the transportation plans are being scrutinized every day. By adopting this plan, the Town now has the right to protect the existing and proposed highway corridors through a wide variety of controls. It is important that the Town of Waxhaw be aware of the different "resources" that will help protect the roadway corridors and generate funding possibilities that will ensure the successful completion of the plan.

The remainder of this chapter will answer two questions:

What are the tools that Waxhaw can use to implement our plan?

Which tools can be used on what priority projects?

What are the tools that Waxhaw can use to implement our plan?

Below are the various tools that will aid the Town of Waxhaw in the protection of the corridors shown on the adopted thoroughfare plan. The description of each tool is followed by a "how to use this tool in Waxhaw" section. The Town should try and use each of these tools to their advantage when trying to implement "the plan".

State and Municipal Adoption of the Thoroughfare Plan

Chapter 136, Article 3A, Section 136-66.2 of the General Statutes of North Carolina provides that after development of a Thoroughfare Plan, the Plan may be adopted by the governing body of the municipality and the Department of Transportation to serve as the basis for future street and highway improvements. The General Statutes also require that, as part of the plan, the governing body of the municipality and Department of Transportation shall reach agreement on responsibilities for existing and proposed streets and highways included in the plan. Facilities which serve through traffic and traffic from outside the area to major business, industrial, governmental, and institutional destinations located inside the municipality are designated a State responsibility (These are the major thoroughfares or blue lines in Figure #3). These types of facilities shall be constructed and maintained by the Division of Highways. Facilities which primarily serve internal travel are designated a municipal responsibility, and shall be constructed and maintained by the municipality (These are minor thoroughfares or the orange lines in Figure #3). Once a thoroughfare plan is adopted, several other planning tools are available to assist plan implementation. Use of these controls and methods can help to maximize expenditure of funds and minimize land disruption.

How to use this tool in Waxhaw: Since the Town adopted the thoroughfare plan on December 8,1997 and the N.C. Board of Transportation adopted the plan on February 6, 1998 the adoption tool has been used to the fullest extent. In the future, a systems agreement will need to be negotiated between the Town of Waxhaw and the Department of Transportation.

Subdivision Regulations

Subdivision regulations are locally adopted laws which govern how a developer may divide land into building sites. Each developer is required to submit a plat of the proposed subdivision to the municipality for approval before a building permit will be issued. Through this process, it is possible to reserve or protect the necessary right-of-way for streets which are a part of the thoroughfare plan and to require street construction in accordance with the plan. By requiring developers to construct subdivision roadways to minimum standards needed for the future proposed thoroughfare road, the maintenance costs are reduced and the transfer of streets to the State Highway System is simplified.

Appendix E of the outlines the recommended subdivision design standards as they pertain to road construction.

How to use this tool in Waxhaw: The Town of Waxhaw already has subdivision regulations. However, it may be important to look at adding a clause encouraging connectivity in developments instead of allowing every new street to be cul-de-sac'd. By not having more than one access point, travel and congestion in these neighborhood areas could become a concern.

Roadway Corridor Official Map

North Carolina General Statutes 136-44.50 through 133-44.53 are collectively designated as the "Roadway Corridor Official Map Act". The roadway corridor official map, more commonly referred to as an official street map, is a document adopted by the legislative body of the community that pinpoints and preserves the location of proposed streets against encroachment. In effect, the official map serves notice on developers that the State or municipality intends to acquire certain specific property. The official map serves as a positive influence for sound development by reserving sites for public improvements in anticipation of actual need.

The NCDOT limits its use of official maps to large scale, fully controlled access facilities planned for developing areas outside of municipal jurisdictions. For projects within municipal jurisdictions, official maps should be prepared and adopted by the local government.

For cities contemplating the adoption of a Roadway Corridor Official Map, there are several issues to consider. First, it should be recognized that an Official Street Map designation places severe, but temporary, restrictions on private property rights. Issuance of building permits and/or the approval of subdivision plans within any property lying within an Official Street Map corridor are prohibited for up to three years. This three year prohibition period commences with the request for development approval. This authority should be used carefully and only in cases where less restrictive powers will be ineffective.

The Statute establishing the Official Street Map authority is fairly explicit in outlining the procedures to be followed and the types of projects to be considered. As required by the Statute, a project being considered for an Official Street Map must be programmed in the State Transportation Improvement Program (TIP) or included in a locally adopted Capital Improvements Program in addition to appearing on the adopted street system plan. The Statute states that the Capital Improvements Program must be for a period of ten years or less and must identify the estimated cost of acquisition and construction of the proposed project as well as the anticipated financing.

The Program and Policy Branch of the North Carolina Department of Transportation is responsible for facilitating the adoption of Roadway Official Corridor Maps. Municipalities considering Official Street Map projects should contact this Branch for their "Guidelines for Municipalities Considering Adoption of Roadway Corridor Maps" at:

Program Development Branch , NC Department of Transportation
P. O. Box 25210
Raleigh, NC 27611

How to use this tool in Waxhaw: This particular tool cannot be used in Waxhaw at the current time because none of the prioritized projects have been listed as funded in the State Transportation Improvement Program (book that tells when funded projects throughout the state will be completed, discussed later in this chapter). However, if the Howie Parkway does get funded in the future, this may be the time for the Town to try and use this type of enforcing tool to protect the corridor for the new roadway. This tool should only be used by the Town if other methods are not successful in protecting the corridor.

Zoning Ordinances

A zoning ordinance can be beneficial to thoroughfare planning by designating appropriate locations of various land uses and allowable densities of residential development. This provides a degree of stability by which future traffic projections can be made so that streets and highways can be planned.

Other benefits of a good zoning ordinance include the establishment of development standards. The standards aid traffic operations on major thoroughfares and minimize strip commercial developments that create traffic friction and increase the traffic accident potential.

How to use this tool in Waxhaw: The Town of Waxhaw already has zoning ordinances that are used for planning purposes, so this tool has already been used. However, the Town may want to look at their current ordinances and make sure that they compliment the recently adopted thoroughfare plan. For example: at the newly created intersections with the Howie Parkway it may be necessary to change from R-2 to a commercial zoning,C-2, at these locations, in order to attract more development. The next section, density credits, is also a good idea to incorporate into zoning ordinances and subdivision regulations in order to acquire right-of-way for roads on the thoroughfare plan. The Town should also look at changing the notation of the zoning so that the code can be read and understood (ie…instead of R-1 representing 100,000 ft^2 lots, use R-100 so that the number is associated with the lot size or type).

Density Credits

Instead of one house per acre
allow 2 house per acre!!

Density credits are incentives for developers to dedicate right-of-way for planned roadways. By dedicating the right-of-way to the Town or state the developer gets two things: (1) his plan approved by the Town, (2) he is allowed to change the density of the development even though it is zoned as something else. This reduces the minimum lot size that a developer may have to have for a development to the next level of zoning. If the current zoning is R20 (20,000 ft^2 lot), then if right-of-way was dedicated the developer could go to R10 (10,000 ft^2 lot). The developer is not losing any sellable lots, and ultimately may benefit by being able to place more houses on the same piece of property. Appendix B gives better detail as to the actual process and how the zoning ordinance may be written.

Development Reviews

Driveway access to a state-maintained street or highway is reviewed by the District Engineer's office prior to access being permitted. Any development expected to generate large volumes of traffic (i.e. shopping centers, fast food establishments, larger industries, etc.) may be comprehensively studied by staff from the Traffic Engineering, Statewide Planning, and Roadway Design Branches of NCDOT. If completed at an early stage, it is often possible to significantly improve the development's accessibility at minimal expense. Since the municipality is the first point of contact for the developer, it is important that the municipality advise them of this review requirement and cooperate in the review process.

How to use this tool in Waxhaw: The Town of Waxhaw has done an outstanding job of having a representative of the county and the district engineers office review plans for developments before giving them approval. This definitely needs to continue and more detail may need to be spent on the driveway locations or access points of these new developments to insure that the proposed or existing roadways will operate efficiently. Some details to look at would be: limiting cul-de-sacs in residential developments, the proximity of driveways near proposed intersection locations, having one access point for major commercial developments or a continuous right turn lane along the front of the development. The Town will also have aerial photos of the bypass sections B & C. These photos have the approximate locations of property lines in the areas where the bypass is proposed to be located and will be helpful in determining if developments will impact the thoroughfare plan. If developments are located near a proposed roadway then the Town should talk with the owner/developer to see if right-of-way could be donated or reserved. If the developer agrees to this reservation of right-of-way then his plan would be approved and he may also get a density credit as previously discussed, or he will not have to pay impact fees (discussed later). The development review process is an opportune time for the Town to get land reserved or donated, thus ultimately reducing the roadway costs and improving the traffic flow in the future.

Urban Renewal

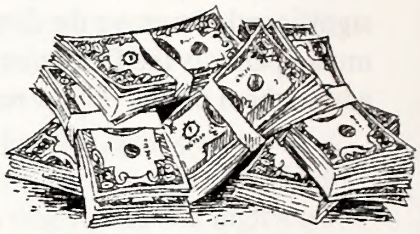
Urban renewal is defined as the rehabilitation of city areas by demolishing, remodeling, or rehabilitation of existing structures in accordance with comprehensive plans. This process allows for corrections to basic problems in the street system layout and design.

To qualify for community development funds or discretionary funds for urban renewal, a municipality must first prepare a community development program. Urban areas compete throughout the State on the basis of demographic points which consider such conditions as

percent of substandard housing, people per square feet of housing, dwelling age, etc. An effort should be made to ensure that community development and transportation plans are compatible.

How to use this tool in Waxhaw: This tool will probably not be something the Town will consider because of the hometown atmosphere that currently exists. The layout of the downtown area is cherished by the community and it is important that the old buildings remain a fixture in this Town.

Funding Programs



Capital Improvement Program

One of the tools which makes it easier to build a planned thoroughfare system is a Capital Improvements Program. This is a long range budget for street improvements, acquisition of right-of-way, and other capital improvements on the basis of projected revenues. Municipal funds should be available for construction of street improvements which are a municipal responsibility, right-of-way cost sharing on facilities designated a Division of Highways responsibility, and advance purchase of right-of-way where such action is required. The program consists of two lists of projects: the projects to be funded and implemented fully by the municipality and a list of projects designated as a State responsibility and funded in the Transportation Improvement Program.

How to use this tool in Waxhaw: The Town should develop these two lists based on the thoroughfare plan and the other capital projects that the Town would like to see accomplished in the next ten years. Also a timetable as to how much money each year is put into each project. Since the Town has already prioritized the roadway projects from the thoroughfare plan then it will be easy to establish which projects should be on which lists. Table #5 below is an example of what the Town of Waxhaw's program might look like.

Table 5 - Example of Capital Improvement Program

Capital Improvement Item	Want Funded by Year	TIP Project Item
1. Extend Water & Sewer	1999	1. NC 16 Widening
2. Widen SR 1111 (Providence Road in front of the school)	2000	2. Howie Parkway
3. Install Metal Posted Streetlights	2001	
4. Improve NC 16 & NC 75 Intersection	2001	

Transportation Improvement Program (TIP)

North Carolina's Transportation Improvement Program (TIP) is a document which lists all major construction projects to be undertaken by the Department of Transportation for the next seven years. TIP projects are matched with projected funding sources. Each year when the TIP is updated, completed projects are removed, programmed projects are advanced, and new projects are added.

During annual TIP public hearings, municipalities request projects to be included in the TIP. A Board of Transportation member reviews all of the project requests for a particular area of the state. Based on the technical feasibility, need, and available finding, the board member decides which projects will be included in the TIP. In addition to highway construction and widening, TIP funds are available for bridge replacements projects, highway safety projects, public transit projects, railroad projects, and bicycle projects.

How to use this tool in Waxhaw: The Town should actively pursue this funding every year that the TIP is updated. The Town must present a logical explanation as to why this project should be funded and present it in a neat and orderly fashion to the Board Member. The packet that was created this past year is a good example for the Town to present to the board member. Appendix C shows the process for which the Town of Waxhaw should go through every year when requesting funding from the Department of Transportation.

Industrial Access Fund

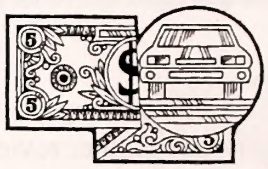
If an industry wishes to develop property that does not have access to a state maintained highway and certain economic conditions are met, the funds may be made available for construction of an access road. For further information regarding this fund, inquiries should be directed to the NC Department of Transportation Secondary Roads Office.

Small Urban Funds

Small Urban Funds are annual discretionary funds for each of the fourteen divisions of the state. Each division receives one million dollars per year for Board members to fund projects at their discretion. These funds are for the construction of projects occurring within city limits or at least within one mile of the municipal boundaries. Requests for Small Urban Fund assistance should be directed to the appropriate Board of Transportation member and Division Engineer.

How to use this tool in Waxhaw: This is a good tool for Waxhaw to use to get some of the smaller project accomplished. Two projects that should definitely be presented to the Division Engineer are intersection improvements. The first one is intersection #5 shown on page 31 of this report. Turn lanes need to be added at this location, since this is not a major project with a high cost the Town should present the information concerning this intersection to the Division Engineer and ask that the intersection be reviewed and improved using Small Urban Funds.

The other intersection is the Simonetti Drive location described on page 33. Even though the bypass is not built, the other legs of the intersection could be corrected to serve the traffic that exists currently. These funds could be used to make the current shopping center entrance a right turn in/out only facility and make all the traffic enter at Simonetti Drive. A signal could then be put at this intersection to allow the traffic to exit out of the shopping center. All of these requests should go to the Division Engineer.



Impact Fees

These fees, called "facility fees" in the legislation, are to be based upon "reasonable and uniform considerations of capital costs to be incurred by the Town as a result of new construction. The facility fee must bear a direct relationship to additional or expanded public capital costs of the community service facilities to be rendered for the inhabitants, occupants of the new construction, or those associated with the development process". Since newly constructed developments are making a traffic impact to the community they should help share the burden of the impact they are making by paying this fee to improve the facilities. The money collected from this fee can only be used on transportation projects. These fees are usually used for local road improvements or additions like turn lanes. Appendix D has some examples of fees that are charged for different types of new developments in cities around North Carolina.

How to use this tool in Waxhaw: Currently Waxhaw has a fee that is paid so that the plans of the development can be reviewed by an engineer and zoning administrator. The Impact Fee is a separate fee that is used for transportation projects only. This would be a good fee in Waxhaw because of the high amount of growth in this area. A lot of the growth in the area is residential and by charging an impact fee on a per house basis the Town would gain some revenue to put towards transportation. Since the tax base is not large at the present time, this would be a way to generate the necessary revenue.

Other Funding Sources

1. Enact a bond issue to fund street improvements.

2. Consider the possibility of specific projects qualifying for federal demonstration project funds.

3. Adopt a collector street plan that would assess buyer or property owners for street improvement.

The Town of Waxhaw has a lot of options that can be explored, both for protecting corridors and obtaining funding for the projects on the thoroughfare plan. The responsibility is up to the Town, to take the initiative to create more revenue through creative endeavors, to upgrade the transportation network and to provide the citizens with a well planned and established community. If the Town exercises the options that are available, then all of these goals will be accomplished.

Appendices

Appendix A

Street Appendix

Appendix A - Street Tabulations for the Town of Waxhaw

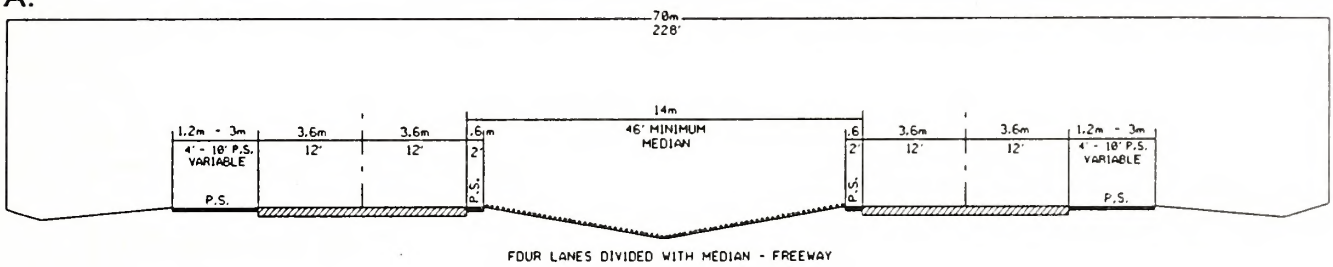
This appendix displays the details of the street network that has been proposed for the Town of Waxhaw in this thoroughfare plan. The chart describes the conditions that exist in 1997 and what the roadways should look like in the year 2025. It shows the recommended number of lanes, the right-of-way required for this type of roadway and a sketch showing the required dimensions for each type of roadway. In order for the town to know what right-of-way will be required in the future for some of these roads the column labeled X-section will give a letter representing the type of cross-section that is recommended for that roadway. That letter can then be found on the figures that follow to determine the right-of-way length in feet or meters that needs to be reserved or protected.

Waxhaw Street Tabulations

Facility & Segment		Existing Road System (1997)									Future (2025)				
		Distance		Roadway			ROW		Capacity	AADT	Capacity	AADT	X-section	ROW	ROW
from	to	(miles)	(km)	(miles)	(km)	lanes	(ft)	(m)	(vpd)	(vpd)	(vpd)	(vpd)		(ft)	(m)
NC 16															
Twelve Mile Creek	Waxhaw Parkway	1.3	2.09	1.3	2.09	2	60	18	11500	9000	41000	18000	C	90	27
Waxhaw Parkway	NC 75	0.63	1.01	0.63	1.01	2	60	18	8000	10300	22000	7500	H	60	18
NC 75															
SR 1326 (Collins Rd.)	Old Providence Road	1.6	2.58	1.6	2.58	2	60	18	12,500	5,200	12,500	3,100	Adequate	60	18
Old Providence Road	Rehobeth Road	0.75	1.21	0.75	1.21	2	50	15	8,000	9,800	10,000	7,500	Adequate	50	15
Rehobeth Road	S.C. State Line	2.1	3.38	2.1	3.38	2	60	18	12500	4300	12500	3000 to 7000	Adequate	60	18
Howie Parkway Section A															
NC 75(E of town)	Howie Mine Rd	0.88	1.42	-	-	-	-	-	-	-	13000	10400	H	60	18
Howie Mine Rd	NC 16	1.88	3.03	-	-	-	-	-	-	-	20000	12900	K	70	21
Howie Parkway Section B															
NC 75(E of town)	Providence Rd	2.42	3.90	-	-	-	-	-	-	-	13000	4900	K	70	21
Howie Parkway Section C															
NC 16	Waxhaw-Marvin Rd	1.33	2.14	-	-	-	-	-	-	-	13000	9300	K	70	21
Waxhaw-Marvin Rd	NC 75(w of town)	0.63	1.01	-	-	-	-	-	-	-	13000	7200	K	70	21
Old Providence Road															
Ethel Street	Essaw Road	0.61	0.98	7.3	11.75	2	60	18	10500	6000	15000	5900	K	70	21
Waxhaw-Marvin Road															
Helms Road	Pineoak Road	0.93	1.50	5.5	8.86	2	60	18	9000	2200	13000	3800	H	60	18

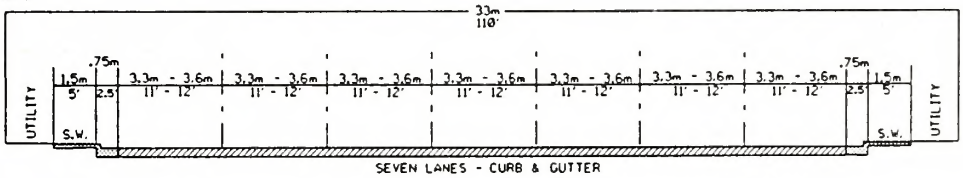
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



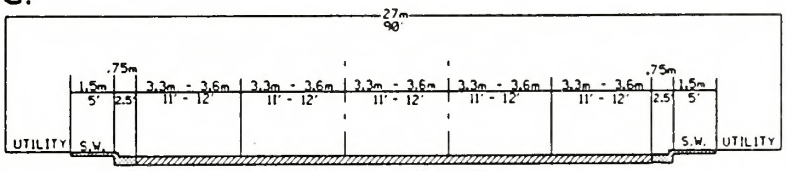
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



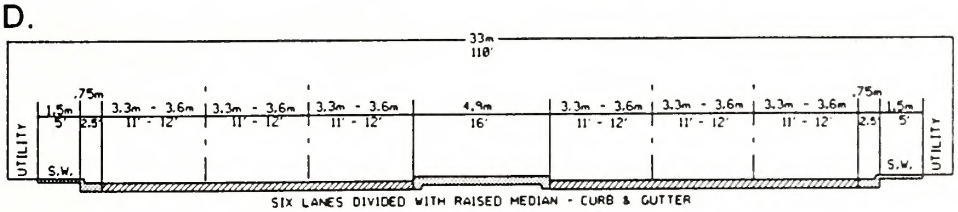
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

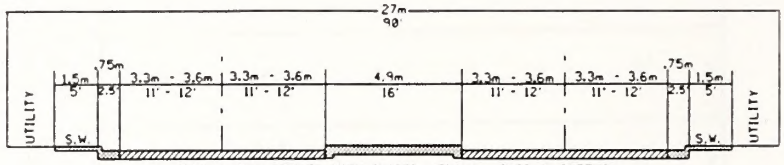
D.



SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

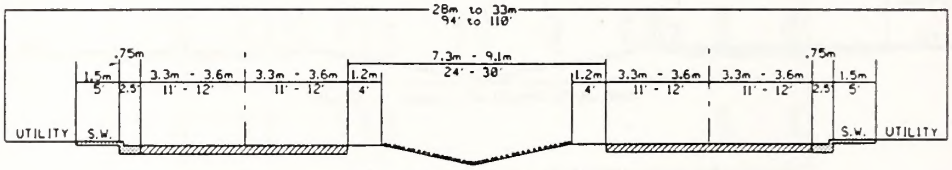
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



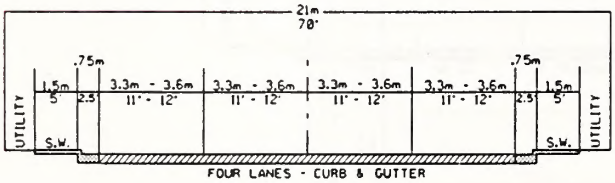
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



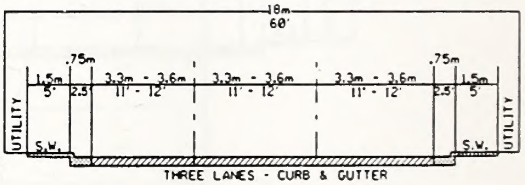
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



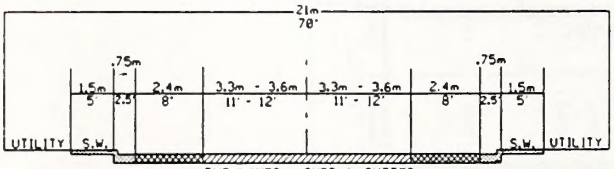
FOUR LANES - CURB & GUTTER

H.



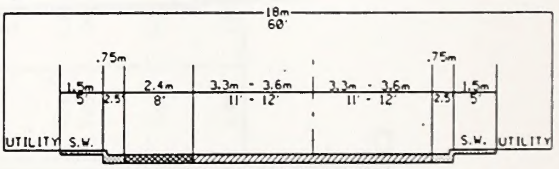
THREE LANES - CURB & GUTTER

I.



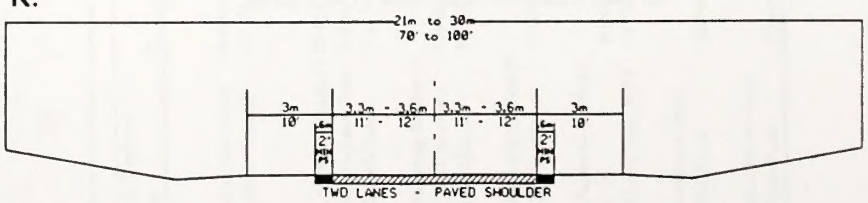
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



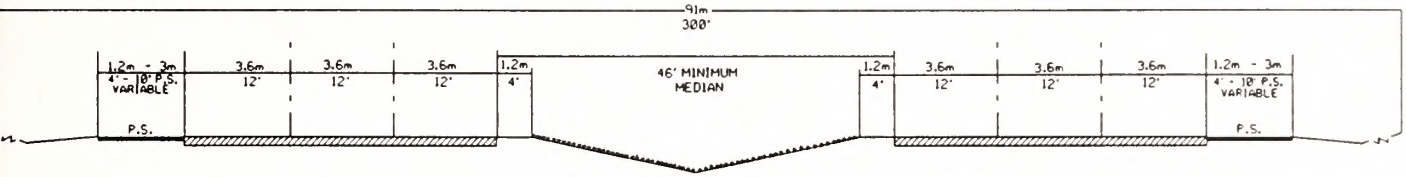
TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

K.



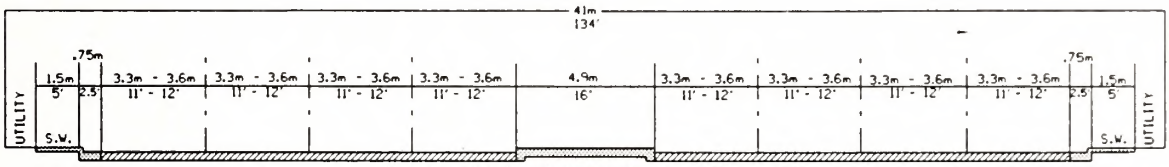
TWO LANES - PAVED SHOULDER

TYPICAL THOROUGHFARE CROSS SECTIONS



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

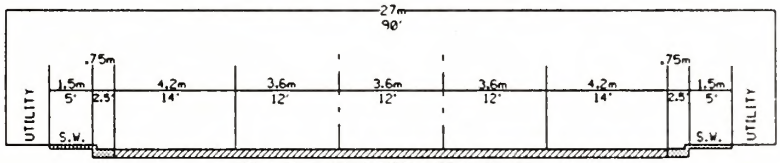
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

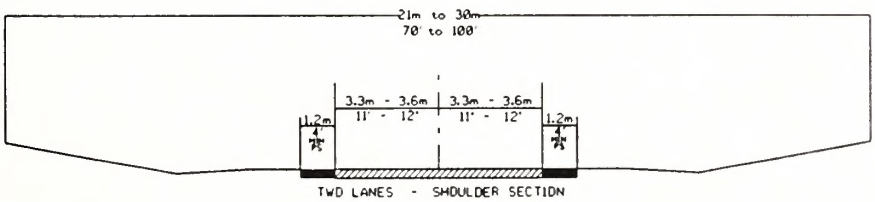
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



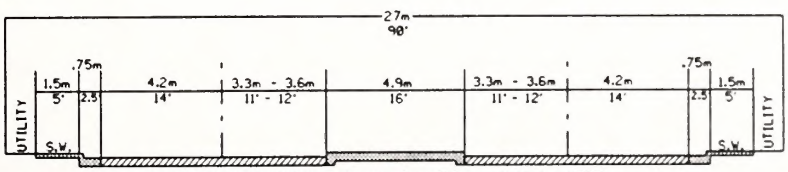
FIVE-LANE ROADWAY WITH CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

Appendix B

Density Credits

DENSITY CREDIT OVERLAY
PROPOSED GENERIC ZONING TEXT

NOTE: The following text describes the use of density credits on lots where road dedication takes place. The application of density credits under such circumstances would not by itself require the rezoning of property to an overlay district.

This text could be located in the general provisions section of each ordinance. In addition, references to this section should be made wherever bulk regulations (e.g., minimum lot sizes, density levels, etc.) are given so that the reader knows that these prescribed levels may be altered through the employment of density credits.

PURPOSE: The purpose of Density Credits is to give incentive to residential and industrial developers who dedicate right-of-way for planned roadways. The credit should allow the dedication to take place without affecting the planned use of the property.

TEXT:
A. Per G.S. 136-66.10, dedication of right-of-way in conformance with the Transportation Plan may be required for subdivisions of land which embrace areas where transportation improvements are proposed. Should such a dedication be required in association with a plat approval, density credits may be used, in a manner as provided herein, on the remaining portions of the tract(s) in question. The granting of such density credits shall be made by (name of approving board). The application of density credits shall not affect whether a use, per se, is allowed or not on that lot. Such shall remain governed by the list of permitted (and, if applicable, conditional) uses for that particular zoning district as listed elsewhere in this Zoning Ordinance.

Density credits may be used to reduce the minimum required lot size for a single-family or two-family dwelling on a percent-by-percent basis provided that the resulting minimum lot size is not made lower than that required for that use in the next least restrictive zoning district. The list of zoning districts in descending degree of restrictiveness is as follows:

1.(most restrictive R_o)
2.
3.
n.(least restrictive R_n)

For jurisdictions that do not have adopted zoning districts, see Appendix A for sample General Use Districts.

The following shall be used in applying density credit bonuses:

1. **Single-Family (including lots containing individual manufactured homes) and Multi-Family Dwellings, Townhouses, Condominiums or Apartments (Method 1)**

Density credits shall not be applicable in the (least restrictive) highest density zoning district. The density credit bonus is derived by applying the succeeding zoning district (R_n) minimum lot size. The incentive for dedication shall be no more than a 25% increase in the maximum number of dwelling units of the original zoning district R_o. That is, the maximum number of dwelling units shall not exceed 1.25 times the maximum allowable number of dwelling units for R_o.

Irrespective of the use of density credits, all yard, height, parking, and setback requirements as stated in the (name of jurisdiction) Zoning Ordinance are to be observed.

2. **Other Non-Residential Developments (Method 2)**

In this method, the density credit bonus is calculated by dividing the amount of remaining area after dedication by the original area before dedication. The density credit bonus shall then be multiplied by the minimum front, side, or rear yard depth in the underlying zoning district.

This formula may be used to reduce the required front, side, or rear yard on any lot which does not directly abut a lot located in a Residential (R) district by up to fifty (50) percent. Density credits can be used to reduce minimum side or rear yard depths by up to twenty-five (25) percent when such yard directly abuts a Residential (R) zoning district.

In no instance may the density credit bonus be used to reduce a required front, side, or rear yard to less than ten (10) feet in width.

Refer to Appendix for an example of how this is to be computed.

3. **Other Non-Residential Development (Method 3)**

In this method, the density credit bonus is calculated by dividing the amount of remaining area after dedication by the original area before dedication. The density credit bonus shall then be multiplied by the maximum height of structures in the underlying zoning district. In no instance, however, may the density credit bonus be used to raise the maximum height of any structure by a factor of greater than thirty-three (33) percent; or twenty-five (25) percent on any lot which directly located in or which directly abuts a Office (O) district or Residential (R) district.

Refer to Appendix for an example of how this is to be computed.

4. **Other Non-Residential Development (Method 4)**

In this method, the density credit bonus is calculated by dividing the amount of remaining area after dedication by the original area before dedication. The density credit should then be divided into the Floor Area Ratio (FAR). The result will be an increase in the allowable FAR for that zoning classification. In no case should an increase of over 25 % of the original FAR be allowed.

Refer to Appendix for an example of how this is to be computed.

5. **Other Non-Residential Development (Method 5)**

In this method, the density credit bonus is calculated by dividing the amount of remaining area after dedication by the original area before dedication. The density credit shall be multiplied by the number of required off-street parking spaces. In no case may the number of off-street parking spaces be reduced by greater than ten (10%) over that which is normally required.

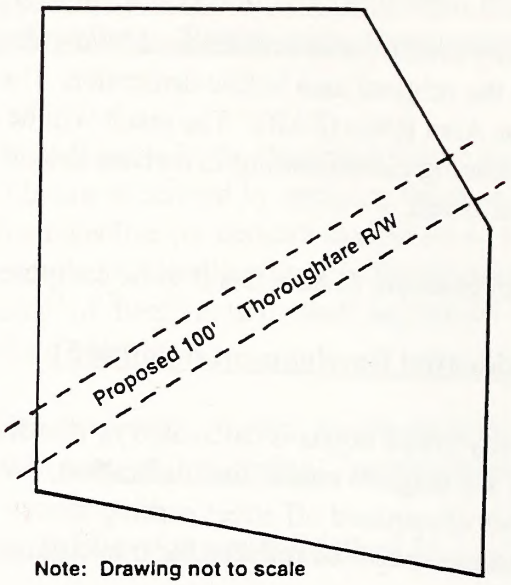
DESIGNATION ON ZONING MAP

All lots which have been given the opportunity to have density credits applied shall be so designated on the Official Zoning Map.

ISSUANCE OF ZONING PERMITS

A zoning permit may not be issued for development on a lot which has been awarded density credits, if such development is contingent upon the use of such density credits, until proof of the right-of-way dedication having been offered to the public has been made.

DENSITY CREDIT BONUS - METHOD 1
TRACT 1



Note: Drawing not to scale

FACTS

1. Tract 1 = 871,200 square feet
2. Area of Thoroughfare ROW = 100,000 square feet
3. Access onto thoroughfare From Tract 1 Is Not Allowed
4. Tract 1 is Zoned R-40.
5. Maximum Allowable Density Bonus = 0.50

DENSITY CREDIT APPLICATION

1. 100,000/871,200 = 0.115
2. 0.115 is less than 0.50
3. 40,000 square feet X 0.115 = 4,600 square feet
4. 40,000 - 4,600 square feet = 35,400 square feet
5. Minimum lot sizes of 35,400 square feet are allowed
6. All applicable yard requirements must be met on each lot

A subdivision is proposed for the above 20 acre (871,200 square foot) tract. One-hundred thousand (100,000) square feet (or 11.5 percent) of the tract's area is taken up by the proposed thoroughfare right-of-way. Tract 1 will not be able to have direct access onto the proposed thoroughfare. Thus, the full density credit (100,000/871,200 or 0.115) is applicable.

The tract is located in a R-40 zone (minimum lot size for single-family dwellings being 40,000 square feet). Minimum lot sizes in the R-40 district for single-family residences can be reduced by 4,600 square feet (40,000 X 0.115) when density credit bonuses are employed. The density credit bonus for this tract, 0.115, is below the 0.50 maximum which is allowed in the R-40 zone.

DENSITY CREDIT BONUS - METHOD 2
Tract 2

FACTS

1. Tract 2 = 871,200 square feet
2. Area of thoroughfare ROW = 100,000 square feet
3. Access onto Proposed Thoroughfare From Tract 2 Is Not Allowed
4. Tract 2 is Zoned R-20.
5. Minimum R-20 Single-Family lot size= 20,000 square feet
6. Next most restrictive zoning district = R-15 (i.e., minimum lot size of 15,000 square feet for single-family lots).

DENSITY CREDIT APPLICATION

1. 100,000/871,200 = 0.115
2. 20,000 X 0.115 = 2,300 square feet
3. 20,000 - 2,300 = 17,700 square feet square feet
4. 17,700 is greater than 15,000 square feet
5. Minimum lot sizes of 17,700 square feet are therefore allowed
6. All applicable yard requirements must be met on each lot

A subdivision is proposed for the above 20 acre (871,200 square foot) tract. One-hundred thousand (100,000) square feet (or 11.5 percent) of the tract's area is taken up by the proposed thoroughfare right-of-way. Access from Tract 2 onto the proposed thoroughfare shall not be permitted. Thus, the full density credit (100,000/871,200 or 0.115) is applicable.

The tract is located in a R-20 zone (minimum lot size for single-family dwellings being 20,000 square feet). To determine the proposed minimum lot size reduction for the development with the application of the density bonus, the density bonus (0.115) is multiplied by the minimum required lot size (20,000) square feet. The resulting figure is 2,300 square feet. Thus, minimum lot sizes can be reduced by a maximum of 2,300 square feet as the next least restrictive zoning district is the R-15 zoning district which requires single-family dwellings with minimum lot sizes of 15,000 square feet.

DENSITY CREDIT BONUS - METHOD 3
TRACT 3

FACTS

1. Tract 3 = 871,200 square feet
2. Area of Thoroughfare ROW = 100,000 square feet
3. Access onto Thoroughfare From Tract 3 Is Not Allowed
4. Maximum allowable density credit = 0.25

DENSITY CREDIT APPLICATION

1. 100,000/871,200 = 0.115
2. 0.115 is less than 0.25
3. Minimum lot sizes can be reduced by up to 11.5 for single and two-family dwellings
4. All applicable yard requirements must be met on each lot

A subdivision is proposed for the above 20 acre (871,200 square foot) tract. One-hundred thousand (100,000) square feet 11.5 percent) of the tract's area is taken up by the proposed thoroughfare right-of-way. Access from Tract 3 onto t thoroughfare shall not be permitted. Thus, the full density credit (100,000/871,200 or 0.115) is applicable.

The full density credit, 0.115, is below the maximum allowed (0.25). Thus, minimum lot sizes can be reduced by a factor 11.5 percent.

DENSITY CREDIT BONUS - METHOD 4
TRACT 4

FACTS

1. Tract 4 = 871,200 square feet
2. Area of Thoroughfare ROW = 100,000 square feet
3. Access onto the Thoroughfare From Tract 4 Is Allowed
4. Maximum allowable density credit = 0.25

DENSITY CREDIT APPLICATION

1. One-half on the right-of-way area (50,000 square feet) can be used towards the density credit bonus application
2. 50,000/871,200 = 0.057
3. 0.057 is less than 0.25
4. Maximum density on developable area of tract (i.e., not in right-of-way dedication area) can increase by a factor of 5.7 percent
5. 17.7 acres X 10.57 units/acre = 187 units
6. 10 units/acre X 0.057 = 10.57 units per acre
7. All applicable off-street parking requirements must be met

A multi-family development is proposed for the above 20 acre (871,200 square foot) tract. One-hundred thousand (100,000) square feet of the tract's area is taken up by the proposed thoroughfare right-of-way. Access from Tract 4 onto the thoroughfare will be allowed. The functional design calls for a 100 foot right-of-way; current subdivision regulations call for a right-of-way of fifty feet. Thus, half of the right-of-way area, or 50,000 square feet, is available for the density bonus. The allowable density credit bonus is computed as 50,000/871,200 or 0.057.

The tract is located in a zone with a maximum multi-family density of 10 units per acre normally being allowed. The amount of developable land on the tract is 771,200 square feet (or 17.7 acres). The 0.057 density credit bonus is then multiplied by the maximum number of units per acre normally allowed (10), and would allow for 0.57 extra units per acre (for a maximum of 10.57 units per acre). Thus, 187 units (17.7 X 10.57) could be built on the tract after dedication has occurred.

DENSITY CREDIT BONUS - METHOD 5
TRACT 5

FACTS

1. Tract 5 = 871,200 square feet
2. Area of Thoroughfare ROW = 100,000 square feet
3. Access onto Thoroughfare From Tract 5 Is Allowed
4. Tract 5 is located in an O-2 zone. It abuts other O-2 properties on all sides.

DENSITY CREDIT APPLICATION

1. One-half on the right-of-way area (50,000 square feet) can be used towards the density credit bonus application
2. 50,000/871,200 = 0.057
3. Maximum density credit bonuses of 0.50 on all sides are allowed
4. 0.057 is less than 0.50
5. Front, side, and rear yards can each be reduced by 5.7 percent
6. All applicable off-street parking requirements must be met

An office development is proposed for the above 20 acre (871,200 square foot) tract. The side and rear yards each abut a R-2 (Residential) zone. One-hundred thousand (100,000) square feet of the tract's area is taken up by the proposed thoroughfare right-of-way. Access to the thoroughfare from Tract 5 will be allowed. The Thoroughfare Plan calls for a 100 foot right-of-way; current subdivision regulations call for a right-of-way of fifty feet. Thus, half of the right-of-way area, or 50,000 square feet, is available for the density bonus. The ensuing density credit bonus is computed as 0.057 (50,000/ 871,200). The tract is located in a 0-2 zone which normally requires a fifty (50) foot front yard, and twenty (20) foot side and rear yards.

The 0.057 density credit bonus is less than any of the maximum allowable density credit bonuses. Thus, the front, side, and rear yards can each be reduced by a maximum of 5.7 percent.

Appendix C

TIP process

Appendix C

Process for Placement of a Project in the Transportation Improvement Program

The process for attempting to get a project into the TIP is described briefly in this appendix.

The local planning board should first decide on which projects they would like funded and placed in the TIP book. They should not try and attempt to get all of the improvements recommended in the thoroughfare plan into the TIP but select carefully a few of the projects that would provide the greatest impact on the traffic network in the area. These projects should be prioritized by the planning board and summarized briefly, as shown on Appendix Page C-2.

After determining which projects are needed in the area then an official letter for the TIP Project Request should be written to the N.C. Board of Transportation member from the municipality's respective district. Along with the letter, should be the prioritized summary of proposed projects for funding, a TIP Candidate Project Request Form for every project that is to be considered for funding and inclusion in the TIP, and a map that describes the location of each project that is being proposed for funding. An example of each one of these items is included in this appendix on the pages that follow.

TOWN OF WAXHAW

P. O Box 6
317 N. Broome St. – Waxhaw, N.C. 28173
Telephone 704-843-2195 – Fax 704-843-2196

Hours: Mon.-Tues.-Thur.-Fri. – 8:00 A.M. to 5:00 P.M.
Wednesday – 8:00 A.M. to 12:00 Noon

October 28, 1997

N. C. Board of Transportation
N. C. Department of Transportation
P. O. Box 25201
Raleigh, North Carolina 27611-5201

Re: 1998 TIP Project Requests for the Town of Waxhaw, NC

Dear Chairman and Committee Members:

Enclosed please find the projects requested by the Town of Waxhaw for consideration in the next TIP update. You will find a list of prioritized projects as approved by the Town Commissioners. You will also find a description of the need for each project as well as the traffic volumes in the Waxhaw area.

Our town commissioners endorses the existing feasibility study of the NC 16 corridor and potential widening of this facility. However, we would like to see the widening of NC 16 to four lanes to stop immediately outside the town limits and continue on into town as we have suggested in the following attachments.

We thank each of you for the opportunity to participate in the development of the TIP and feel that these projects are worthy of inclusion in the 1998 TIP update. Please contact us immediately if additional information is needed concerning any of the enclosed project requests.

Sincerely,

Jack M. Hemby

Jack Hemby
Mayor

Enclosures

Priority and Needs for the Requested TIP Projects

Priorities

1) **NC 16 from NC 75 to Twelve Mile Creek -**
   * Widen to accommodate traffic
   * Request Project Funding and Schedule

2) **Waxhaw Loop (Section 1) -**
   * Section of the loop from that extends from NC 75east of town to NC 16 north of town.
   * Request funding for a new roadway that serves as a bypass for through travel from Charlotte to Monroe.

3) **Waxhaw Loop (Section 2) -**
   * Section of the loop that extends from NC 75 (East of town) south to Providence Road South (SR 1117)
   * Request feasibility study for a new roadway that serves local traffic getting from the primary residential locations north of town to the three schools that are located south of town

4) **Waxhaw Loop (Section 3) -**
   * Section of the loop that extends from NC 16 to the southwest to NC 75
   * Request a feasibility study for a new roadway that will serve through traffic going from Charlotte to South Carolina

Needs

The Town of Waxhaw is one of the fastest growing small communities in the state. It is evident that this town is quickly becoming a "bedroom town" for the Charlotte Metropolitan Area due to the atmosphere of the community and its isolation from the hustle and bustle of a large city. Although pleased with the residential growth in the area, the concern is for the decline of the transportation system at the expense of this growth. Therefore the need for some transportation improvements in the town is necessary. The following is a brief description of the needs of the prioritized projects listed above. Following these descriptions are the project fact sheets for each of the prioritized projects.

Highway Program
TIP Candidate Project Request

Date 10/23/97 Priority No. 1

County Union City/Town Waxhaw

Requesting Agency Town of Waxhaw NCTIP No. R-3802 (if available)

Route (US, NC, SR/Local Name) NC 16

Project Location (From/To/Length) From the Twelve Mile Creek bridge to NC 75

Length = 1.8 miles

Type of Project (Widening, New Facility, Bridge Replacement, Signing, Safety, Rail Crossing, Bicycle, Enhancement, etc.)
Widening

Existing Section

Existing Cross Section 28 feet (K) Type 2 lane with paved shoulders

Existing Row 70' Feet 1997 ADT 9000

Proposed Section

Proposed Cross Section 70 feet (C) Proposed ROW 90 feet

Type 5 Lane from 12 Mile Creek to Hickory Grove shopping center (Simonetti Dr) & 3 Lanes from Simonetti Dr to NC 75

2025 ADT 19100

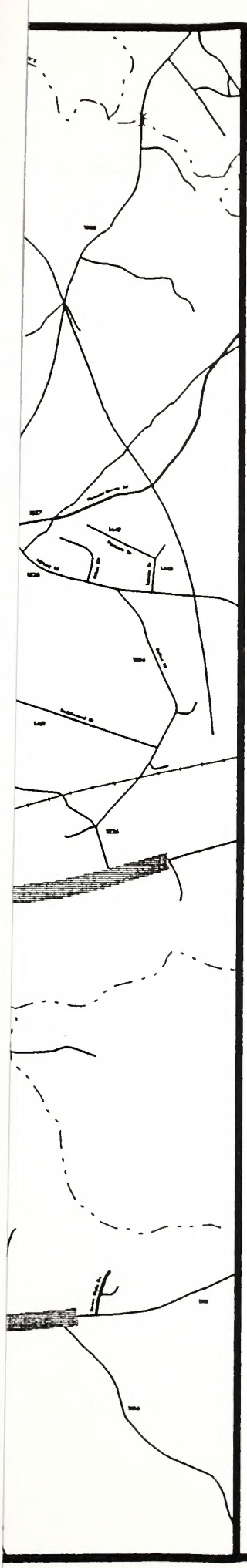
Estimated Cost, ROW $ 200,000 Construction $ 3.8 Million

Brief Justification for Project This major thoroughfare exists as a 2 lane facility from Waxhaw to Charlotte. The volumes are expected to increase dramatically because of the residential development along NC 16. This widening will increase the capacity and allow for this area to develop comfortably without worsening the transportation network in the area.

Project Supported By (Agency/Group) Town of Waxhaw, Centralina Council of Governments, Statewide Planning Branch of NCDOT

Other Information/ Justification

- ☒ Part of Thoroughfare Plan
- ☐ Part of Comprehensive Plan
- ☐ Serves School
- ☐ Serves Hospital
- ☐ Obsolete Facility
- ☐ Serves Park
- ☐ High Accident (#)
- ☒ Feasibility Study in 1997 TIP



PRIORITY #1

FOR THE CITY OF

WAXHAW

THOROUGHFARE
LEGEND

	existing	proposed
MAJOR		
MINOR		

IMPROVEMENTS
LEGEND

Five Lane Curb & Gutter

Three Lane Curb & Gutter

Two Lane 24' w/Paved Shoulders

Two Lane w/Right
Turn Lane for School

Intersection Improvements

Adopted by:

Town of Waxhaw _____

Union County _____

Recommended by
Statewide Planning _____

NCDOT _____

N

S

Base Map 10-1-97

WAXHAW

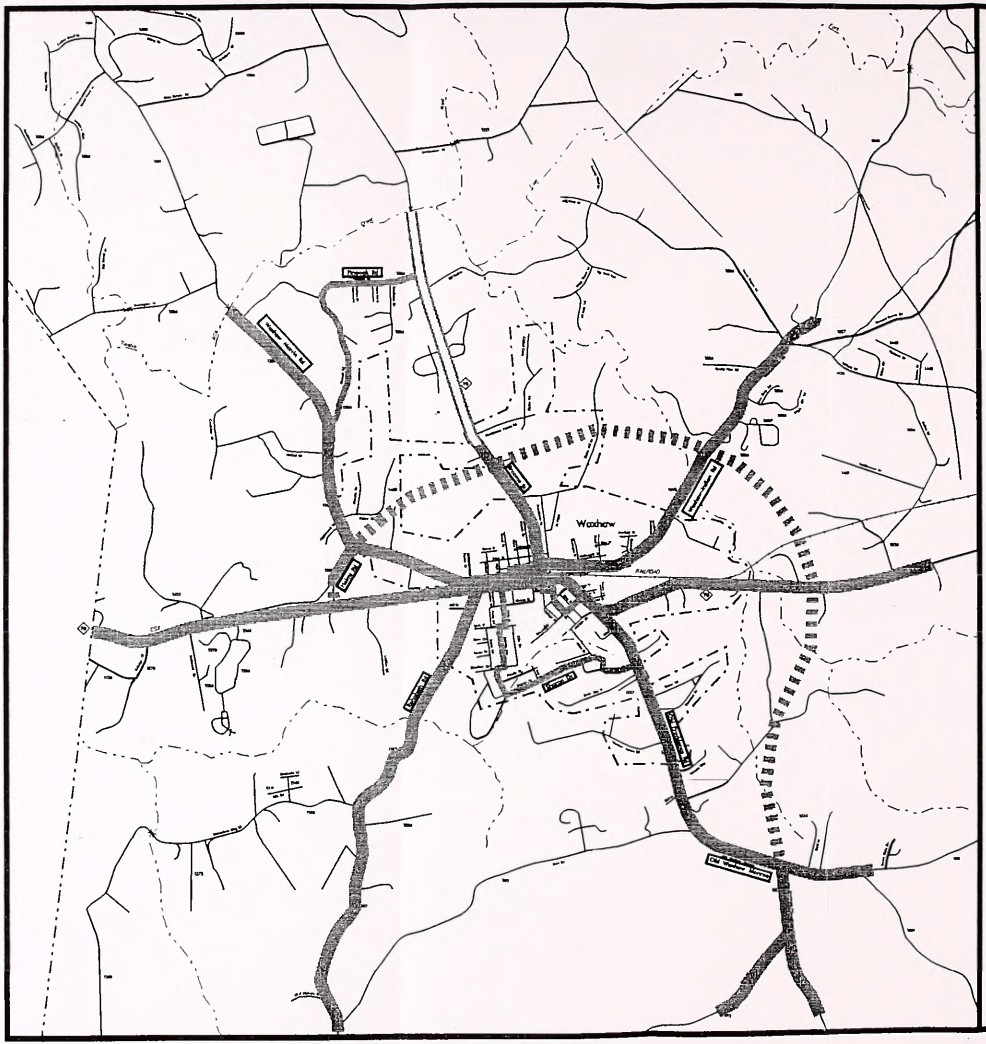
UNION COUNTY
NORTH CAROLINA

Prepared by the

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

In cooperation with the

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION



PRIORITY #1

FOR THE CITY OF

WAXHAW

THOROUGHFARE LEGEND

	existing	proposed
MAJOR		
MINOR		

IMPROVEMENTS LEGEND

- Five Lane Curb & Gutter
- Three Lane Curb & Gutter
- Two Lane 24' w/Paved Shoulders
- Two Lane w/Right Turn Lane for School
- Intersection Improvements

Adopted by:

Town of Waxhaw _____

Union County _____

Statewide Planning _____

NCDOT _____

N

S

Base Map 10-6-97

WAXHAW

UNION COUNTY
NORTH CAROLINA

PREPARED BY THE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

Appendix D

Example Impact Fees

Appendix D - Impact Fees

This appendix shows an example of how impact fees are used to help with implementation of a roadway network plan. It explains what the fees are used for and the actual fee amount for each given condition. The actual formulas are also given as a point of reference as to how the set fees were determined.

This is an example meant to provide an idea of how impact fees are used in other cities across North Carolina and to give the Town of Waxhaw a starting place of reference if it is decided to implement this type of action.

ple

181.00

1,835.00

Greater than 299,999 sq. ft., per 1,000 sq. ft.[4]	950.00
Outdoor *retail* display areas as a primary use, per acre[1]	1,939.00
or as determined by *retail* building square footage[4], whichever is greater.	

302.00

302.00

302.00

NOTES:

[1] A standard based on acreage refers to the total land and water surface area of any lot or lots on which any primary, accessory, or *incidental use* or portion thereof is located.

80.00

[2] A standard based on parking *shall* be levied on the basis of the minimum parking standards in 10-2061(a) not withstanding any exceptions, variances, tree credits, nonconformities, or any other reduction.

543.00

[3] A standard based on *students* refers to total *student* capacity of either any new school or any addition to an existing school. Twenty-five (25) *students* is the *student* capacity for each temporary classroom.

438.00

[4] A standard based on square footage excludes heated interior pedestrian walkways within a shopping center when the requirements of 10-2124(b) are met.

334.00

[5] *Specialized recreation* facilities in *public parks shall* pay the same thoroughfare facility fee as *general recreation*, and the land areas, including associated required off-street parking, for these *specialized recreation* facilities *shall* not be used in calculating the acreage of the *public park*.

80.00

[6] *Hotels* or *motels* which contain any convention or civic center *shall*, in addition to paying thoroughfare fee based on rooming units, also pay the thoroughfare fee based on *general recreation* for the civic center or convention center.

135.00

[7] For *retail* uses that include the sale of motor fuels to the public, the fee *shall* be the greater of the charge based on *retail* square footage or applicable acreage standard, or a charge of $190.00 per *retail* delivery pump.

32.00

83.00

43.00

Formula[a]

$$\frac{G}{F} = S, \frac{1.55}{S} = TT \times Y = N, N \times C = Fee$$

Formula[b]

$$\frac{G}{F} = S, \frac{2.41}{S} = TT \times Y = N, N \times C = Fee$$

Formula[a]

473.00

Formula[b]

473.00

127.00

0.16

Where G = floor area gross of the entire institution

F = full time equivalent enrollment

S = square foot of floor area gross per *student*

T = *trips* per square foot of floor area gross

Y = floor area gross of the *new construction*

N = total *trips* generated by the *new construction*

C = 30.65

$1,092.00

982.00

1,247.00

1,148.00

Appendix D -Impact Fee Example

Sec. 10-8003.
FACILITY FEES IMPOSED ON NEW CONSTRUCTION.

(a) In addition to all other charges prescribed by ordinance, resolution now or hereafter in effect, there *shall* be facility fees charged to *new construction* located within both the corporate limits of the *City* and its extraterritorial planning jurisdiction. No *person* shall make any improvement until all applicable thoroughfare or open space facility fees contained in the *following* schedules have been paid in full. No building permit or other *City* permit, for those improvements not requiring a building permit, *shall* be issued for any activity requiring the payment of a facility fee until the facility fees hereby required have been paid in full. Payment of such fees *shall* not relieve the *feepayor* from the obligations to comply with land development regulations of chapter 3 nor from making site-related improvements.

THOROUGHFARE AND COLLECTOR STREET FEE SCHEDULE

Residential	
Utility apartment, per unit	$ 153.00
Single-family, per unit	307.00
Multiple-units, per unit	187.00
Mobile home, per unit	147.00
Retirement community, per unit	101.00
Hotel/motel, per unit[6]	313.00
Recreation	
Golf course, per parking space[2]	170.00
Public parks, per acre[1,5]	110.00
Stadiums/coliseums/race tracks, per 1,000 seats	5,026.00
General recreation (all other), per parking space[2]	95.00
Industrial	
Industrial/manufacturing/agricultural processing, per 1,000 sq. ft. of floor area gross	181.00
or per acre[1] (whichever is greater)	1,835.00
Warehousing/wholesale/distribution/transfer-storage facility, per 1,000 sq. ft. of floor area gross	302.00
Passenger transportation terminals, per 1,000 sq. ft. of floor area gross	302.00
Emergency service facilities, per 1,000 sq. ft. of floor area gross	302.00
Mini-warehousing, per 1,000 sq. ft. of floor area gross	80.00
Office, hospitals, and *medical care facilities*	
Less than 100,000 sq. ft., per 1,000 sq. ft. of floor area gross	543.00
100,000—199,999 sq. ft., per 1,000 sq. ft. of floor area gross	438.00
Greater than 200,000 sq. ft., per 1,000 sq. ft. of floor area gross	334.00
Institutional	
Group quarters, per bed	80.00
Churches, per 1,000 sq. ft. of floor area gross	135.00
Elementary and middle schools, per *student*[3]	32.00
Daycares, per licensed enroll	83.00
High schools, per *student*[3]	43.00
General baccalaureate colleges or universities; junior colleges; community colleges, technical, or vocational institutions: (Expansions)	Formula[a]
(New uses) per 1,000 sq. ft.	473.00
Major research universities (Expansions)	Formula[b]
(New uses) per 1,000 sq. ft.	473.00
Cemetery, per acre	127.00
Individual interment site	0.16
Retail[7]	
Less than 50,000 sq. ft., per 1,000 sq. ft.[4]	$1,092.00
50,000—99,999 sq. ft., per 1,000 sq. ft.[4]	982.00
100,000—199,999 sq. ft., per 1,000 sq. ft.[4]	1,247.00
200,000—299,999 sq. ft., per 1,000 sq. ft.[4]	1,148.00
Greater than 299,999 sq. ft., per 1,000 sq. ft.[4]	950.00
Outdoor *retail* display areas as a primary use, per acre[1]	1,939.00
or as determined by *retail* building square footage[4], whichever is greater.	

NOTES:

[1] A standard based on acreage refers to the total land and water surface area of any lot or lots on which any primary, accessory, or *incidental use* or portion thereof is located.

[2] A standard based on parking *shall* be levied on the basis of the minimum parking standards in 10-2061(a) not withstanding any exceptions, variances, tree credits, nonconformities, or any other reduction.

[3] A standard based on *students* refers to total *student* capacity of either any new school or any addition to an existing school. Twenty-five (25) *students* is the *student* capacity for each temporary classroom.

[4] A standard based on square footage excludes heated interior pedestrian walkways within a shopping center when the requirements of 10-2124(b) are met.

[5] *Specialized recreation* facilities in *public parks shall* pay the same thoroughfare facility fee as *general recreation*, and the land areas, including associated required off-street parking, for these *specialized recreation* facilities *shall* not be used in calculating the acreage of the *public park*.

[6] *Hotels* or *motels* which contain any convention or civic center *shall*, in addition to paying thoroughfare fee based on rooming units, also pay the thoroughfare fee based on *general recreation* for the civic center or convention center.

[7] For *retail* uses that include the sale of motor fuels to the public, the fee *shall* be the greater of the charge based on *retail* square footage or applicable acreage standard, or a charge of $190.00 per *retail* delivery pump.

Formula[a]

$$\frac{G}{F} = S, \frac{1.55}{S} = TT \times Y = N, N \times C = Fee$$

Formula[b]

$$\frac{G}{F} = S, \frac{2.41}{S} = TT \times Y = N, N \times C = Fee$$

Where
- G = floor area gross of the entire institution
- F = full time equivalent enrollment
- S = square foot of floor area gross per *student*
- T = *trips* per square foot of floor area gross
- Y = floor area gross of the *new construction*
- N = total *trips* generated by the *new construction*
- C = 30.65

Appendix E

Recommended Subdivision Ordinances

Appendix E

Recommended Subdivision Ordinances[1]

Definitions

I. Streets and Roads:

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intrastate and inter-county service at relatively high overall speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provide access to the arterial system.

4. Minor Collector - a road which provides service to small local communities and traffic generators and provides access to the major collector system.

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of interstate, other freeway, expressway, or parkway roads and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perfrom the function of collecting traffic from local streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

---

[1]The following design standards are in Metric and English units. Conversion factors are included on page A-10 of the Appendix.

C. Specific Type Rural or Urban Streets

1. Freeway, expressway, or parkway - Divided multilane road- ways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major inter- sections. A parkway is for non-commercial traffic, with full or partial control of access.

2. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. Local Residential Street - Cul-de-sacs, loop streets less than 750 meters (2500 ft) in length, or streets less than one and a half kilometers in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

5. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides of develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development

and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than four hectares where no street right-of-way dedication is involved, (3) the public acquisition, by purchase, of strips of land for the widening or the opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than 0.8 hectares (.32 acres) into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

DESIGN STANDARDS

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality. The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

1. Rural	**Min. ROW(m)**	**Min. ROW(ft)**
a. Principle Arterial - Freeways	105 meters	350 feet
- Other	60 meters	200 feet
b. Minor Arterial	30 meters	100 feet
c. Major Collector	30 meters	100 feet
d. Minor Collector	24 meters	80 feet
e. Local Road	18 meters	60 feet

2. Urban	Min. ROW(m)	Min. ROW(ft)
a. Major Thoroughfare other than Freeway and Expressway	27 meters	90 feet
b. Minor Thoroughfare	21 meters	70 feet
c. Local Street	18 meters[1]	60 feet
d. Cul-de-sac	Variable[2]	

The subdivider will only be required to dedicate a maximum of 30 meters (100′) of right-of-way. In cases where over 30 meters (100′) of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 30 meters (100′). On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than eighteen meters in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. *Local Residential*
   Curb and Gutter section: 7.8 meters (26′), face to face of curb
   Shoulder section: 6 meters (20′) to edge of pavement, 1.2 meters (4′) for shoulders

2. *Residential Collector*
   Curb and Gutter section: 10.2 meters (34′), face to face of curb
   Shoulder section: 6 meters (20′) to edge of pavement, 1.8 meters (6′) for shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

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[1] The desirable minimum right-of-way (ROW) is 18 meters (60′). If curb and gutter is provided, 15 meters (50′) of ROW is adequate on local residential streets.

[2] The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around t ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

1. Design Speed - The design speed for a roadway should be a minimum of 10 km/h greater than the posted speed limit. The design speeds for subdivision type streets shall be:

Facility Type	Design Speed					
	Desirable		Minimum			
			Level		*Rolling*	
	km/hr	mph	km/hr	mph	km/hr	mph
Rural						
Minor Collector Roads	100	60	80	50	70	40
Local Roads Including Residential Collectors and Local Residential	80	50	80	50	70	40
Urban						
Major Thoroughfares other than Freeway or Expressway	100	60	80	50	80	50
Minor Thoroughfares	100	60	80	50	70	40
Local Streets	70	40	70	40	50	30

2. Maximum and Minimum Grades

   a. The maximum grades in percent shall be:

Facility Type	Design Speed (km/h)	Design Speed (mph)	Maximum Vertical Grade (Percent)		
			Flat	Rolling	Mountainous
Rural					
Minor Collector Roads*	30	20	7	10	12
	50	30	7	9	10
	60	35	7	8	10
	90	55	6	7	9
	100	60	5	6	8
	110	70	4	5	6
Local Roads Including Residential Collectors & Local Residential Streets*	30	20	--	11	16
	50	30	7	10	14
	60	35	7	9	12
	90	55	6	8	10
	100	60	5	6	--
Urban					
Major Thoroughfares other than Freeway or Expressway	50	30	8	9	11
	60	35	7	8	10
	90	55	6	7	9
	100	60	5	6	8

Design Speeds Continued

Minor Thoroughfares[1]	30	20	9	10	12
	50	30	9	9	10
	60	35	9	8	10
	90	55	7	7	9
	100	60	6	6	8
	110	70	5	5	6
Local Streets[1]	30	20	-	12	17
	50	30	8	11	15
	60	35	8	10	13
	90	55	7	9	11
	100	60	6	7	-

b. Minimum grade should not be less than 0.5% .

c. Grades for 30 meters (105') each way from intersections (measured from edge of pavement) should not exceed 5%.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

Sight Distance

Design Speed		Stopping Sight Distance			
		Minimum		*Desirable Minimum*	
km/h	mph	meters	feet	meters	feet
30	20	30	100	30	100
50	30	60	200	70	250
60	35	80	275	90	300
90	55	140	500	170	600
100	60	160	525	210	700

Design Speed		Minimum K2 Value for:			
		Crest		*Sag*	
km/h	mph	meters	feet	meters	feet
30	20	3	10	4	20
50	30	10	30	12	40
60	35	18	50	18	50
90	55	71	160	40	130
100	60	105	310	51	160

[1] For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters long (500'), grades may be 2% steeper than the values in the above table

[2]K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in meters of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

4. The "Superelevation Table" shown below and continued on the next page shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

Superelevation Table

Design Speed		**Maximum e**	**Minimum Radius**	
km/h	*mph*		*meters*	*feet*
50	30	0.04	100	302
60	40	0.04	150	573
90	50	0.04	375	955
100	60	0.04	490	1528
50	30	0.06	90	273
60	40	0.06	135	509
90	50	0.06	335	849
100	60	0.06	435	1380
50	30	0.08	80	252
60	40	0.08	125	468
90	50	0.08	305	764
100	60	0.08	395	1206

e = rate of roadway superelevation, meter per meter

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 60 meters (200′) between survey centerlines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than one hundred and fifty (150) meters (500′) in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should

not be less than the distance from the edge of pavement to right-of-way line on the approaching the turn around. Cul-de-sacs should not be used to avoid connection with an ex street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are made for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least 6 meters (20′).

3. Dead-end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities at the dead-end as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 9 meters (30′) from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 1.8 meters (6′) from the face of curb.

I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:
   a. Shoulder section approach
      I. Under 800 ADT design year
         Minimum 8.4 meters (28′) width face to face of parapets, rails, or pavement width plus 3 meters (10′), whichever is greater.

II. 800 - 2000 ADT design year

Minimum 10.2 meters (34′) width face to face of parapets, rails, or pavement width plus 3.6meters (12′), whichever is greater.

III. Over 2000 ADT design year

Minimum width of 12 meters (40′), desirable width of 13.2 meters (44′) width face to face of parapets or rails.

b. Curb and gutter approach

I. Under 800 ADT design year

Minimum 7.2 meters (24′) face to face of curbs.

II. Over 800 ADT design year

Width of approach pavement measured face to face of curbs.

Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 450 millimeters (1′ 6″), or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 2.4 m (8′) minimum, 3 m (10′) desirable.)

b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

English To Metric Conversion Table

English Units		S.I. Units	Abbreviation
1 inch	equals	25.4 millimeters	(mm)
1 foot	equals	0.3 meters	(m)
1 mile	equals	1.6 kilometers	(km)
1 acre	equals	2.47 hectares	(hect)

Metric Equivalents

1 millimeter	equals	0.001 meters
1 kilometer	equals	1000 meters
1 hectare	equals	10,000 square meters